

Semantic Architecture

2010 Winter ESIP Federation Meeting

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Scenario

*From "ORION Cyberinfrastructure Concept of Operations - Version 0r08 2006.05.11",
Section B: Getting and Using Products - (page 6)*

... (POIM refers to the model that Dr. Chu is building and using. It assimilates data to run the model.)

Fortunately, the ORION systems all support a straightforward "publish and subscribe" model for distributing data. A data user can subscribe to a data stream, asking to receive any new data as soon as they is measured by an instrument. In this case, POIM has subscribed to all of the variables it needs, and executes whenever a new value is received for any of them. If data arrive while POIM is running, it will cache them, finish

Working Group OOI Semantic Prototype

- Semantic Registry and Repository MBARI
- Harvester UCSD
- Faceted Browser RPI
- Metadata Registry UCSD
- Semantic Mediawiki UCSD

- John Graybeal (lead), UCSD
- Luis Bermudez (co-lead), SURA
- Peter Fox (principal), RPI
- Ilya Zaslavsky (principal), UCSD
- Carlos Rueda (developer), MBARI
- Matthew Rodriguez (developer), UCSD
- Michael Meisinger (architect), UCSD
- Roger Unwin (developer), UCSD
- Stephan Zednik (developer), RPI
- Zhenning Shangguan (developer), RPI
- Patrick West (developer), RPI
- Baoije Iowa (developer), RPI

Heterogeneity

Example two NetCDF files via OPeNDAP in the marine domain

Different Long Names

☐ **time: Array of 64 bit Reals [time = 0..24]**

time:

long_name: "Valid Time"
units: "hour since 2000-01-01 00:00:00"
NAVO_code: 13
time_origin: "2000-01-01 00:00:00"

http://edac-dap.northerngulfinstitute.org/thredds/dodsC/ncom/region7/ncom_glb_reg7_200910300.nc.html

☐ **time: Array of 32 bit Integers [time = 0..22015]**

time:

long_name: "Epoch Time"
short_name: "time"
standard_name: "time"
units: "seconds since 1970-01-01 00:00:00"

<http://dods.ndbc.noaa.gov/thredds/dodsC/data/ocean/15319/15319o9999.nc.html>

No Standard
Name attribute

No NAVO code

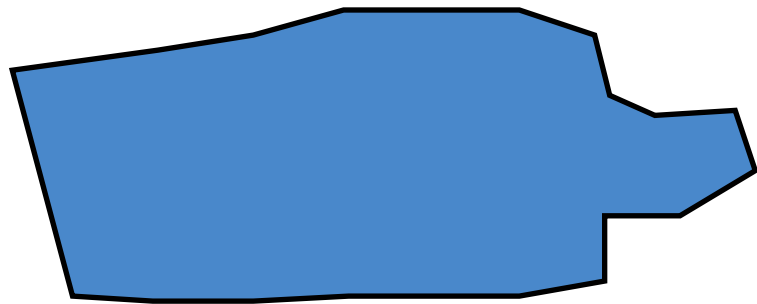
Incomplete Metadata

```
institution: "NOAA National Data Buoy Center and  
Participators in Data Assembly Center"  
url: "http://dods.ndbc.noaa.gov"  
quality: "Automated QC checks with periodic manual QC"  
conventions: "COARDS"  
station: "15319"  
comment: "Sanha - WANE 25947"  
location: "5.58 S 11.83 E "  
Unlimited_Dimension: time
```

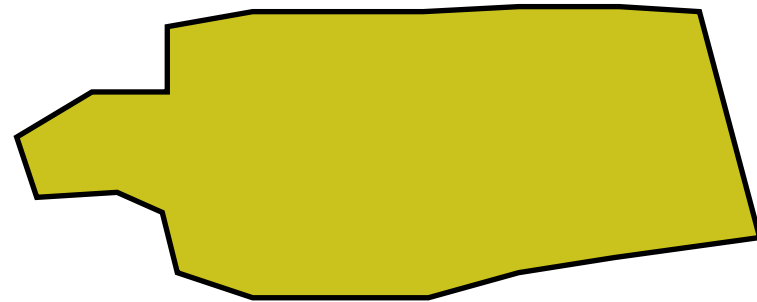
Contact
Information ?

Well...

why don't we do semantic
mediation ?



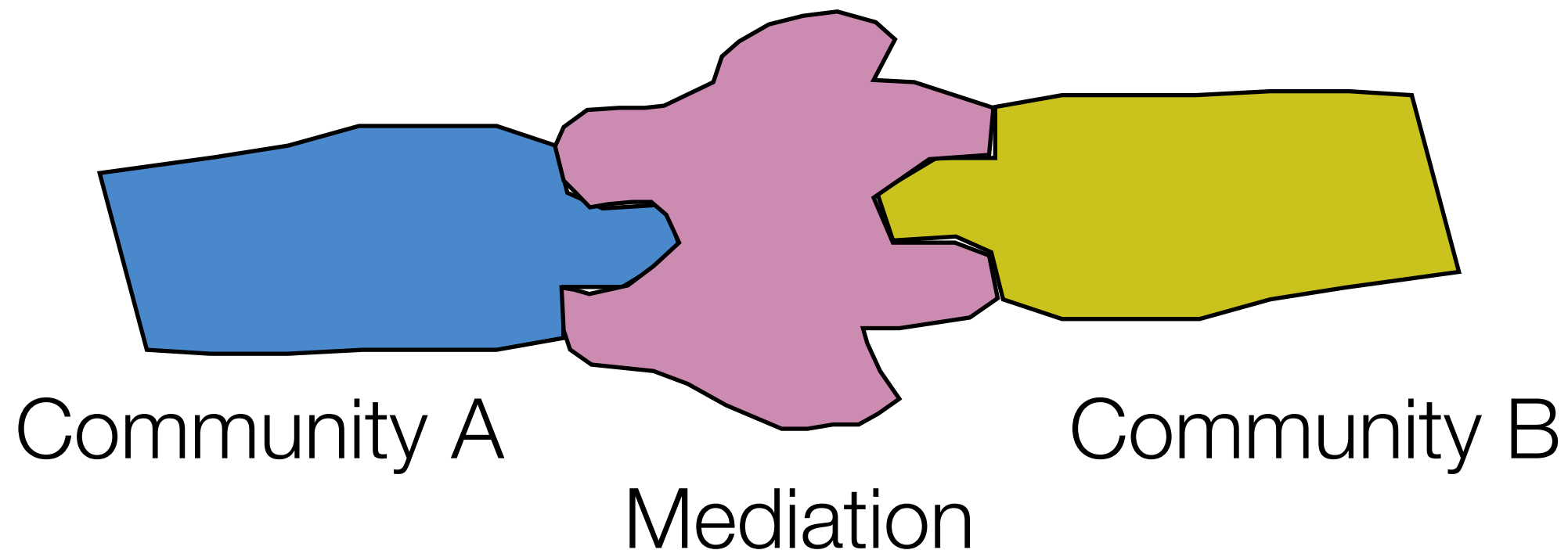
Community A



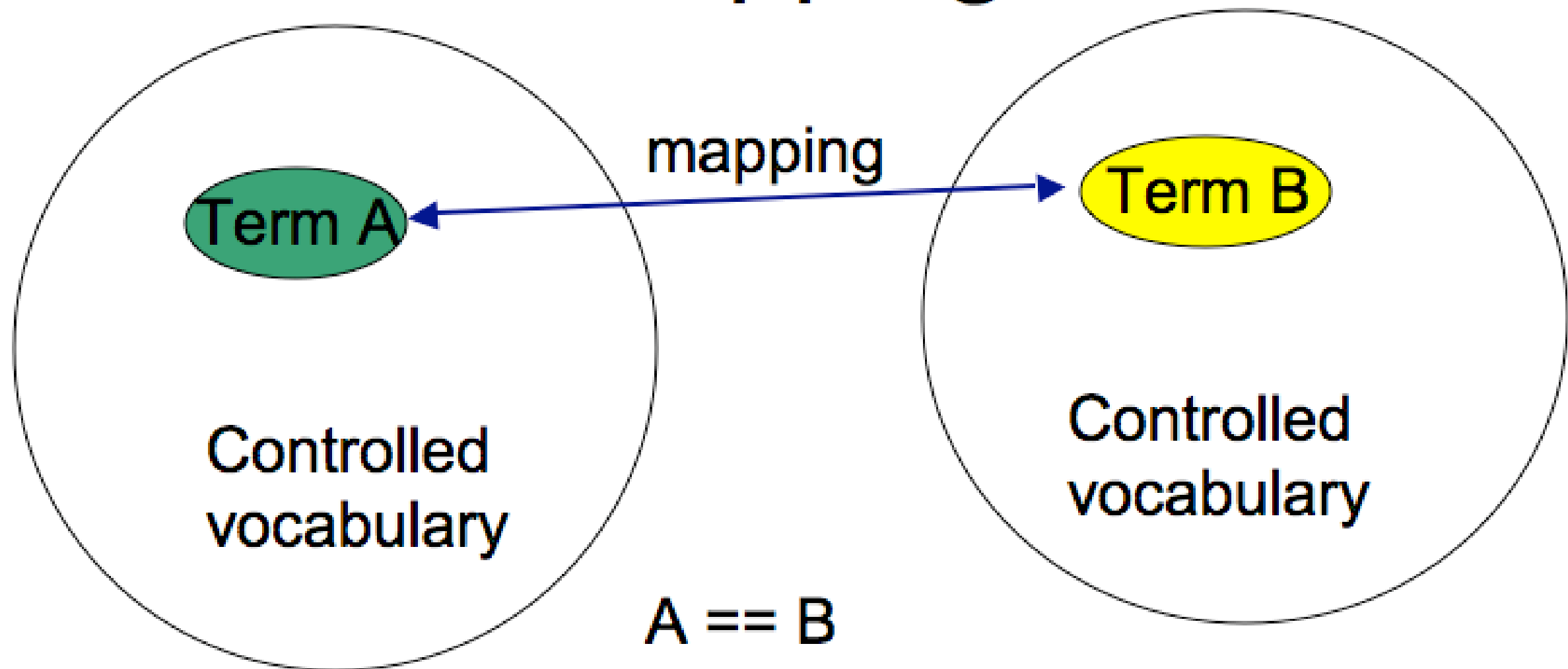
Community B

Well...

why don't we do semantic
mediation ?



Mapping



$A == B$

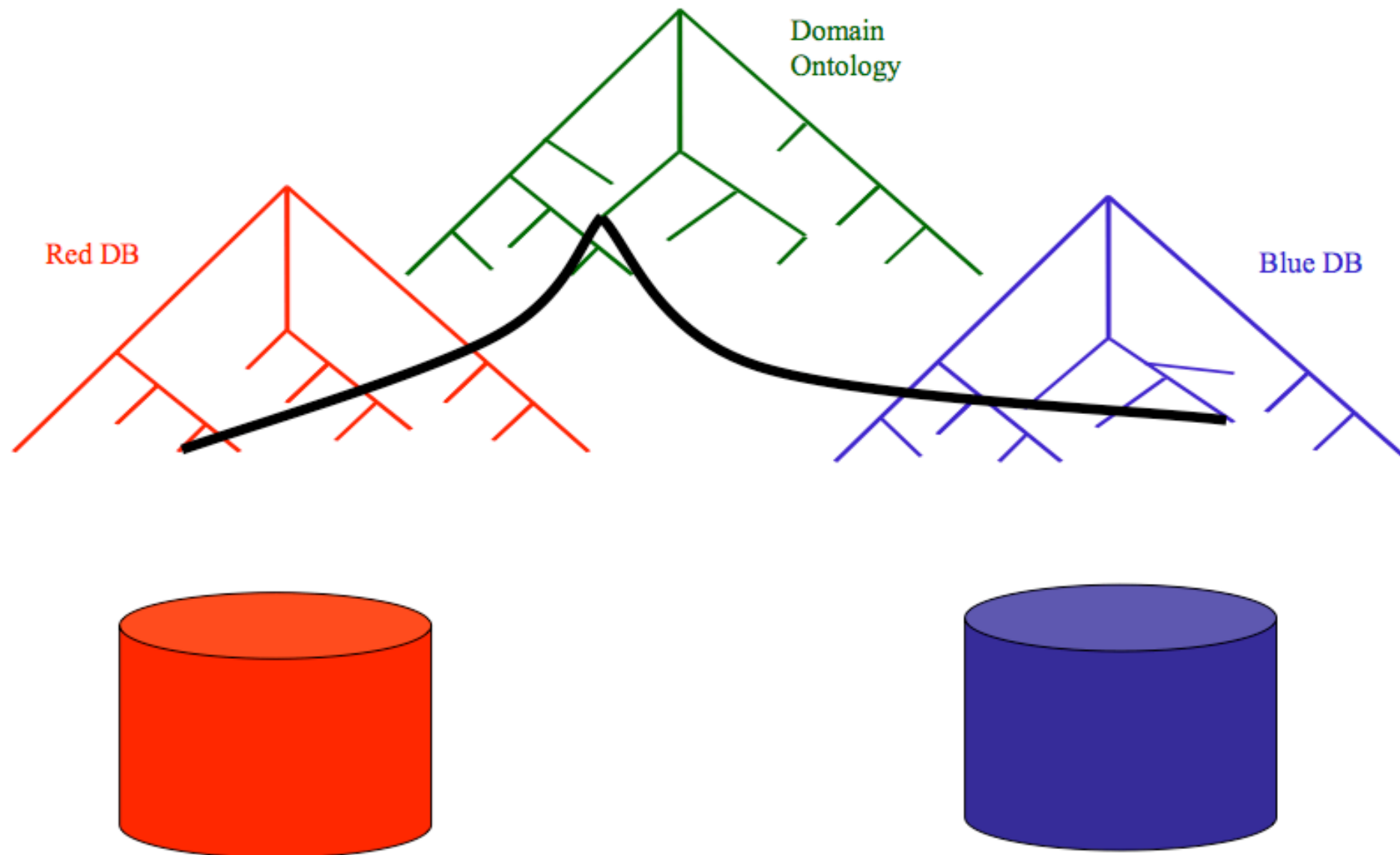
A subclass of B

A is a type of B

A is Narrower Than B

...

Interoperability using ontologies formal community agreements of controlled vocabularies



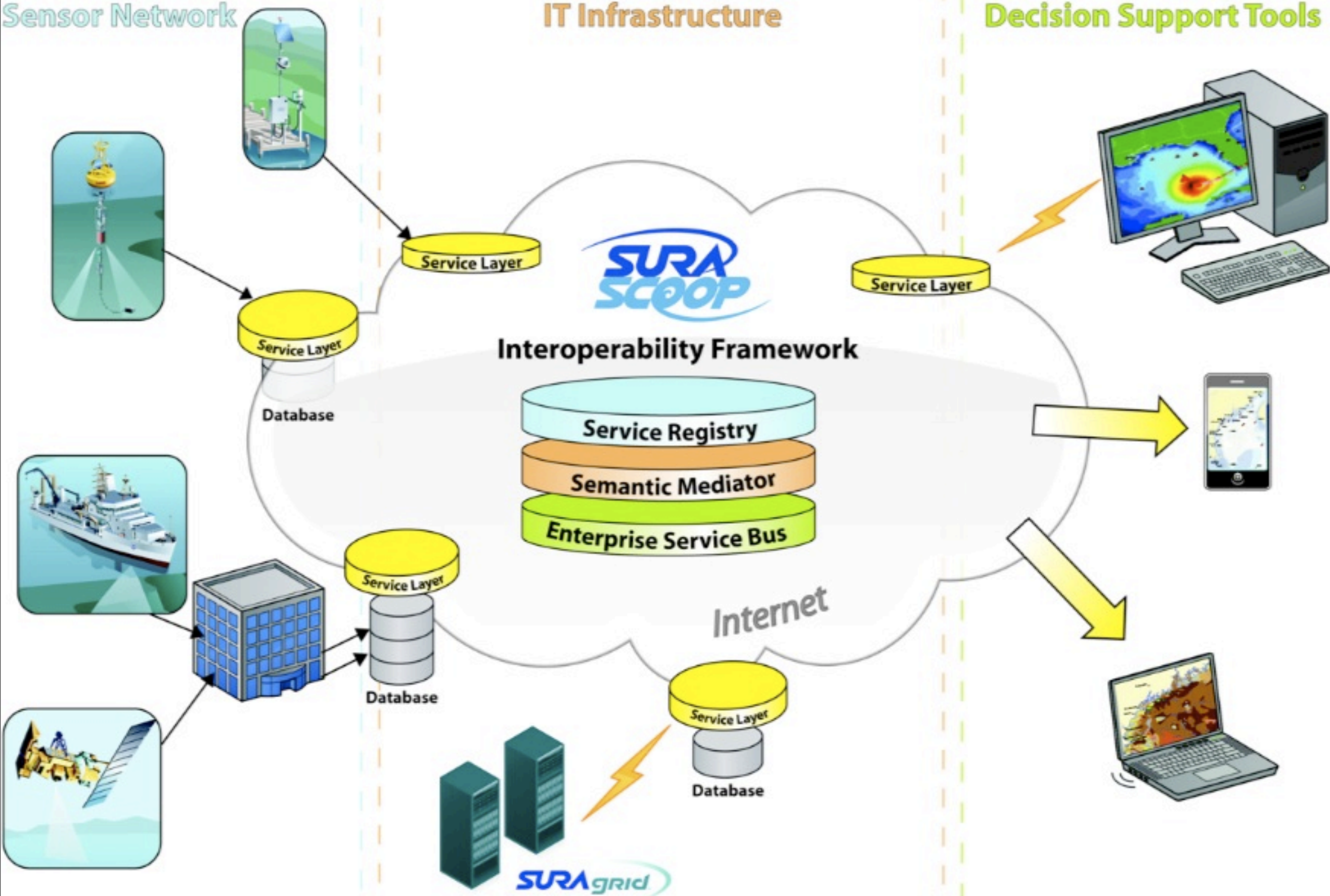
Can we envision a **common semantic framework** to solve *ontology wranglings* ?



Sensor Network

IT Infrastructure

Decision Support Tools



Type of Components

- **Registry and Repository** - Manages and stores, resources, triples, rules, mappings etc. Enables collaboration for maintaining ontologies.
- **Harvester** - reads metadata and data and converts it to RDF.
- **Semantic Graph Builder** - builds RDF triples including instances from the harvester, rules, domain ontologies, ontology mappings etc.
- **Faceted Browser** - Displays results organized by categories.

Main Components

- **Registry and Repository**: Manages and stores, resources, triples, rules, mappings etc. Enables collaboration for maintaining ontologies.
- Harvester - reads metadata and data and converts it to RDF
- Semantic Graph Builder - builds RDF triples including instances from the harvester, rules, domain ontologies, ontology mappings etc
- Faceted Browser - Displays results organized

Semantic Mediator

Vocabulary
Builder

(1a) Register
Vocabularies

Ontology
Registry

(6) Request
Vocs

(7) Receive
Vocs

Semantic
Engine

(0) Create
Vocabularies

(1b) Register
Vocabularies

(8) Issue semantic
query

(9) Receive semantic
response

Semantic
Providers

*Acquire metadata
Identify semantics
Find target vocabularies*

(3) Register
Mappings

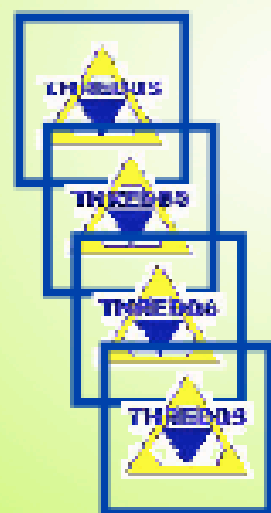
(4) Request
Vocs or
vocabularies

(5) Receive
Vocs or
vocabularies

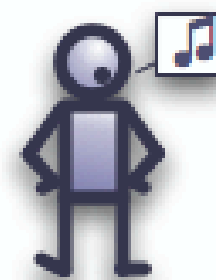
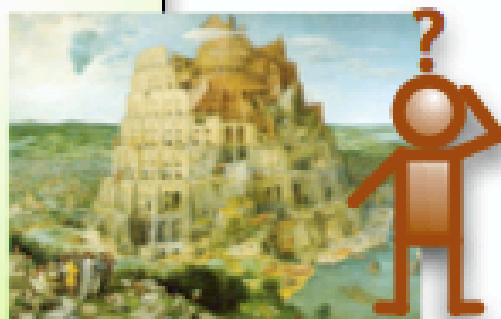
(2) Create
Mappings

Mappings
Builder

Data Providers



[Producer]



Data Users

Portal 1: Catalog


Portal 2: Faceted Search

Portal 3: THREDDS Data Server



[Consumer]

Register

 **Marine Metadata Interoperability**
Ontology Registry and Repository alpha

[bermud](#)

Review and Register Cancel

(creating new ontology) -

► Metadata details

▼ Contents

Synopsis of ontology contents:

Please specify your ontology file.

☒ Local file: Browse...

☐ Preserve original base namespace

Load ontology Details

MMI Portal 1.5.0.alpha29 (20090929182050)

Create ontologies from scratch

Review and Register


Cancel







(creating new ontology) -

► Metadata details

▼ Contents

Vocabulary contents:

 Class name:*

 		
	name	description
 1		

MMI Portal 1.5.0.alpha29 (20090929182050)

▼ Metadata details

General

Usage/License/Permissions

Original source

? Resource type: qualityFlag (<http://mmisw.org/ont/mmi/theme/qualityFlag>)

? Full title: Argo QA/QC Flags

? Content creator:

? Ontology creator: Stephanie Watson

? Brief description:

QA/QC flags used in Argo

? Keywords: quality, QA, QC, Argo

? Link to original vocabulary:

? Link to documentation: <http://argo.jcommops.org/FTPRoot/Argo/Doc/argo-quality-control-ma>

? Authority abbreviation: argo

? Contributor(s): Annie Wong, Robert Keeley, Thierry Carval, and the Argo Data Management Team.


Update and Revisions

Available versions for <http://mmisw.org/ont/argo/qualityFlag>

URI	Name	Author	Version	Submitter
▶ http://mmisw.org/ont/argo/20081116T040146/qualityFlag	Argo QA/QC Flags	Stephanie Watson	20081116T040146	graybeal
▶ http://mmisw.org/ont/argo/20081113T203523/qualityFlag	Argo QA/QC Flags	Stephanie Watson	20081113T203523	swatson

Close

Browse


Marine Metadata Interoperability
Ontology Registry and Repository alpha

[Create vocabulary](#)
[Upload](#)

☒ Submitter

[-All-](#)
[aisenor](#)
[amilan](#)
[bermud](#)
[carueda](#)
[carueda3](#)
[caruedagm](#)
[cchandler](#)
[cdip](#)
[dallison](#)
[dhr.sfsu@gmail.com](#)
[graybeal](#)
[haag](#)
[haines](#)
[jfredericks](#)
[kwalz](#)

Name	Author
▶ AGU Index Terms	AGU
▶ ARGO Instruments	ARGO
▶ ARGO Parameters	ARGO
▶ Argo QA/QC Flags	Stephanie Watson
▶ Authority Vocabulary	MMI
▶ CDIP Term Vocabulary	CDIP
▶ CeNCOOS water monitoring subset and extension of CF parameter vocabulary	Dale Robinson
▶ CF NetCDF Standard Names	CF Metadata
▶ Climate and Forecast (CF) standard names parameter vocabulary	Luis Bermudez
▶ Demo in the q2o break out	q2o
▶ DRDC and CF Mapping	Anthony W. Isenor
▶ DRDC Atlantic NADAS Parameter Codes	Anthony W. Isenor
▶ EPIC Key File (Units)	Pacific Marine Environmental Labora (NOAA)
▶ Extended Continental Shelf (ECS) Device Vocabulary	Amilan
▶ Integrated Global Ocean Services System (IGOSS) QA/QC Flags	Stephanie Watson
▶ IOOS Vocabulary Version 1	Stephanie Watson
▶ IRD QA/QC Flags	Stephanie Watson

Use - Get the RDF

<http://mmisw.org/ont?form=rdf&uri=http://mmisw.org/ont/argo/qualityFlag>

```
<omv:description>QA/QC flags used in Argo</omv:description>
<omv:version>Latest terms per null</omv:version>
<omvmmi:origMaintainerCode>argo</omvmmi:origMaintainerCode>
<omv:keywords>quality, QA, QC, Argo</omv:keywords>
<omv:hasContributor>Annie Wong, Robert Keeley, Thierry Carval, and the Argo Data M
<omv:acronym>qualityFlag</omv:acronym>
<omv:uri>http://mmisw.org/ont/argo/qualityFlag</omv:uri>
<omv:documentation>http://argo.jcommops.org/FTPRoot/Argo/Doc/argo-quality-control-
<dc:description>QA/QC flags used in Argo</dc:description>
<omvmmi:shortNameUri>http://mmisw.org/ont/mmi/theme/qualityFlag</omvmmi:shortNameU
<dc:title>Argo QA/QC flags</dc:title>
<dc:contributor>Annie Wong, Robert Keeley, Thierry Carval, and the Argo Data Manag
<omvmmi:creditRequired>not specified</omvmmi:creditRequired>
</owl:Ontology>
<owl:Class rdf:about="http://mmisw.org/ont/argo/qualityFlag/Qualityflag">
  <rdfs:label>qualityflag</rdfs:label>
</owl:Class>
<owl:DatatypeProperty rdf:about="http://mmisw.org/ont/argo/qualityFlag/code">
  <rdfs:domain rdf:resource="http://mmisw.org/ont/argo/qualityFlag/Qualityflag"/>
  <rdfs:label>Code</rdfs:label>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:about="http://mmisw.org/ont/argo/qualityFlag/description">
  <rdfs:domain rdf:resource="http://mmisw.org/ont/argo/qualityFlag/Qualityflag"/>
  <rdfs:label>Description</rdfs:label>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:about="http://mmisw.org/ont/argo/qualityFlag/source_notes">
  <rdfs:domain rdf:resource="http://mmisw.org/ont/argo/qualityFlag/Qualityflag"/>
  <rdfs:label>Source Notes</rdfs:label>
</owl:DatatypeProperty>
<Qualityflag rdf:about="http://mmisw.org/ont/argo/qualityFlag/_7">
  <source_notes>Argo from from IODE Summary Spreadsheet QualityFlags.xls</source_not
  <description>Not used</description>
  <code>7</code>
```


SPARQL Queries

```
SELECT ?property ?value
```

```
WHERE
```

```
{<urn:ogc:def:datatype:iso-19107::gm_polygon>
```

```
?property ?value. }
```



Your SPARQL query:

[SPARQL](#) (Simple
query language
information [here](#)
Use this form to
[Registry and Repository](#)
Both GET and POST

CONSTRUCT examples

```
CONSTRUCT { ?s ?p ?o } WHERE { ?s ?p ?o . } LIMIT 20
```

```
SELECT ?s ?p
```

```
PREFIX dc: <http://purl.org/dc/elements/1.1/>  
CONSTRUCT { ?s dc:creator ?creator }  
WHERE { ?s dc:creator ?creator . }
```

```
PREFIX dc: <http://purl.org/dc/elements/1.1/>  
SELECT ?s ?c  
WHERE { ?s dc:creator ?c }
```

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>  
PREFIX owl: <http://www.w3.org/2002/07/owl#>  
CONSTRUCT { ?class rdf:type owl:Class . }  
WHERE { ?class rdf:type owl:Class . } LIMIT 20
```

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>  
PREFIX owl: <http://www.w3.org/2002/07/owl#>  
SELECT ?class  
WHERE { ?class rdf:type owl:Class . }
```

<http://mmisw.org/ont/sparql.html>

SPARQL Result

```
<?xml version="1.0"?>
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:j.0="http://mmisw.org/ont/ogc/def/">
  <j.0:Ogcdef rdf:about="urn:ogc:def:datatype:iso-19107::gm_polygon">
    <j.0:uri>urn:ogc:def:datatype:ISO-19107::GM_Polygon</j.0:uri>
    <rdfs:label>urn:ogc:def:datatype:ISO-19107::GM_Polygon</rdfs:label>
    <j.0:description>A Polygon is a special surface that is defined by a
      single surface patch</j.0:description>
  </j.0:Ogcdef>
</rdf:RDF>
```

Handling of URNs

<http://mmisw.org/portal/#http://mmisw.org/ont/ogc/def>

?		
	uri	description
1	urn:ogc:def:crs:OGC:1.3:CRS83	NAD83 longitude-latitude B.4 in OGC 06-042
2	urn:ogc:def:dataType:ISO-19107::GM_Aggregate	A (heterogeneous) geometry collection that includes one or more geometry members
3	urn:ogc:def:ebRIM-ClassificationScheme:UNSD::GlobalRegions	Standard country or area codes and geographical regions for statistical use (UNSD)
4	urn:ogc:def:crs:OGC:1.3:AUTO42003:99:8888	Auto orthographic B.9 in OGC 06-042
5	urn:ogc:def:ebRIM-RegistryPackage:OGC::Root	Root package containing all extension packages
6	urn:ogc:def:ebRIM-RegistryPackage:OGC::Basic	Basic extension package
		Describes the service endpoints and

Easy Mapping

Legend for mapping operators:

- ☐ Exact match
- ☐ Close match
- ☐ Narrower than
- ☐ Broader than
- ☐ Related match

Working ontologies:

A: <http://mmisw.org/ont/igoss/qualityFlag/> -- Integrated Global Ocean Services System (IGOSS) QA/QC

B: <http://mmisw.org/ont/argo/qualityFlag/> -- Argo QA/QC Flags

Search the following ontologies:

Search for:

Select: Selected: 1 out of 14 element(s)

☐ ▶ A:_7

☐ ▶ A:_5

☒ ▼ A:_4

http://mmisw.org/ont/igoss/qualityFlag/_4

label:4

code:4

description: The element appears erroneous
source notes: Integrated Global Ocean Services
System from from IODE
Summary Spreadsheet

☐ Exact match

☐ Close match

☐ Narrower than

☐ Broader than

☐ Related match

Search the following ontologies:

Search for:

Select: Selected: 1 out of 14 element(s)

☐ ▶ B:_0

☐ ▶ B:_6

☐ ▶ B:_5

☒ ▼ B:_3

http://mmisw.org/ont/argo/qualityFlag/_3

label:3

code:3

description: Probably bad data (spike-
gradient- ? if other tests passed)

source notes: Argo from IODE Summary

Select:

Mappings:

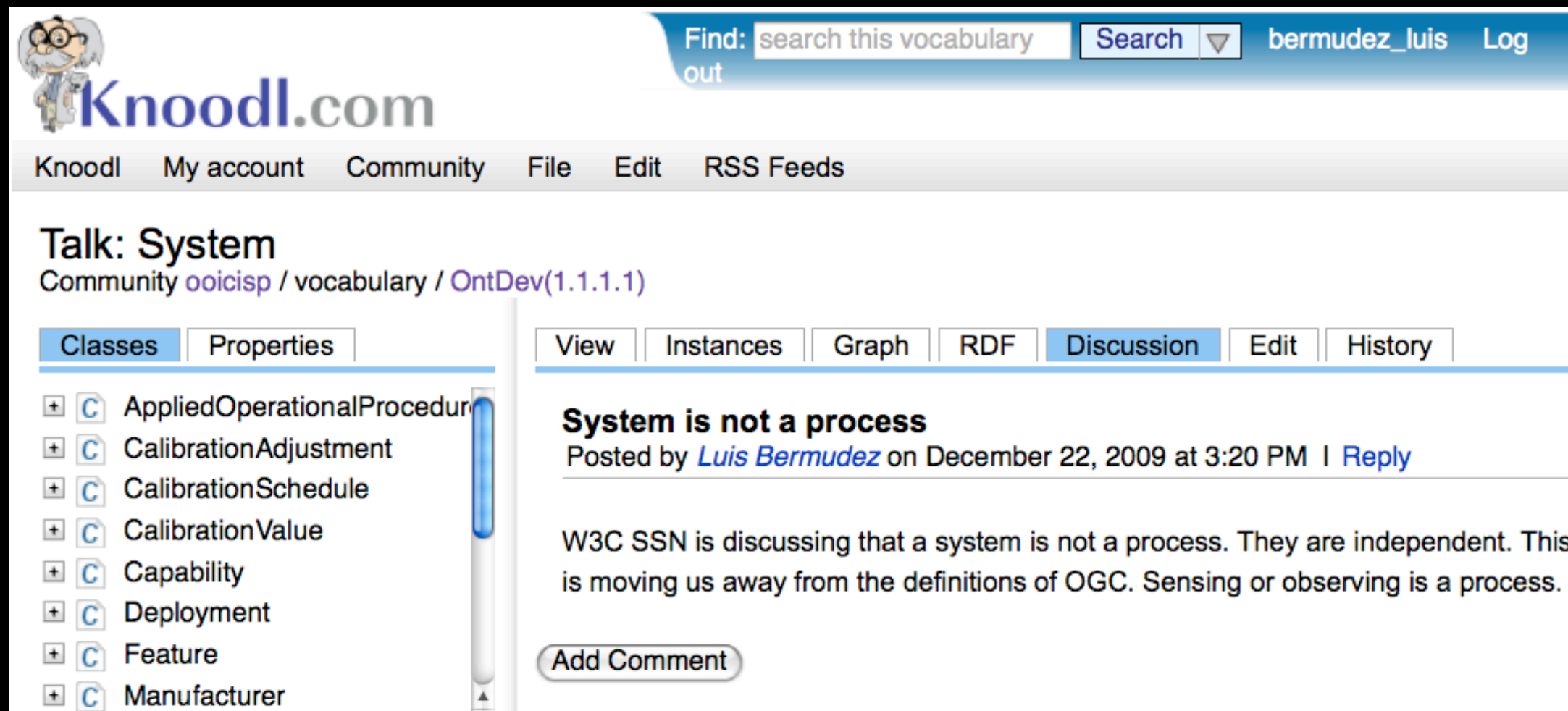
☐ ▶

A:_4. ☐ B:_3.

Collaboration

Functionality to be implemented by MMI OOR

- Managing of groups
- Managing of threads / issues



The screenshot shows the Knoodl.com website interface. At the top, there is a search bar with the text "Find: search this vocabulary" and a "Search" button. To the right of the search bar, the user "bermudez_luis" is logged in, with a "Log out" link. Below the search bar, there is a navigation menu with links: "Knoodl", "My account", "Community", "File", "Edit", and "RSS Feeds". The main content area is titled "Talk: System" and shows a breadcrumb trail: "Community ooicisp / vocabulary / OntDev(1.1.1.1)". Below the title, there are tabs for "Classes", "Properties", "View", "Instances", "Graph", "RDF", "Discussion", "Edit", and "History". The "Discussion" tab is selected. On the left side, under the "Classes" tab, there is a list of classes with expandable icons: "AppliedOperationalProcedur", "CalibrationAdjustment", "CalibrationSchedule", "CalibrationValue", "Capability", "Deployment", "Feature", and "Manufacturer". The main discussion area shows a post titled "System is not a process" by "Luis Bermudez" on December 22, 2009 at 3:20 PM. The post content reads: "W3C SSN is discussing that a system is not a process. They are independent. This is moving us away from the definitions of OGC. Sensing or observing is a process." There is an "Add Comment" button below the post.

Good example: <http://www.knoodl.com>

Main Components

- Registry and Repository - Manages and stores, resources, triples, rules, mappings etc. Enables collaboration for maintaining ontologies.
- **Harvester** - reads metadata and data and converts it to RDF
- Semantic Graph Builder - builds RDF triples including instances from the harvester, rules, domain ontologies, ontology mappings etc
- Faceted Browser - Displays results organized

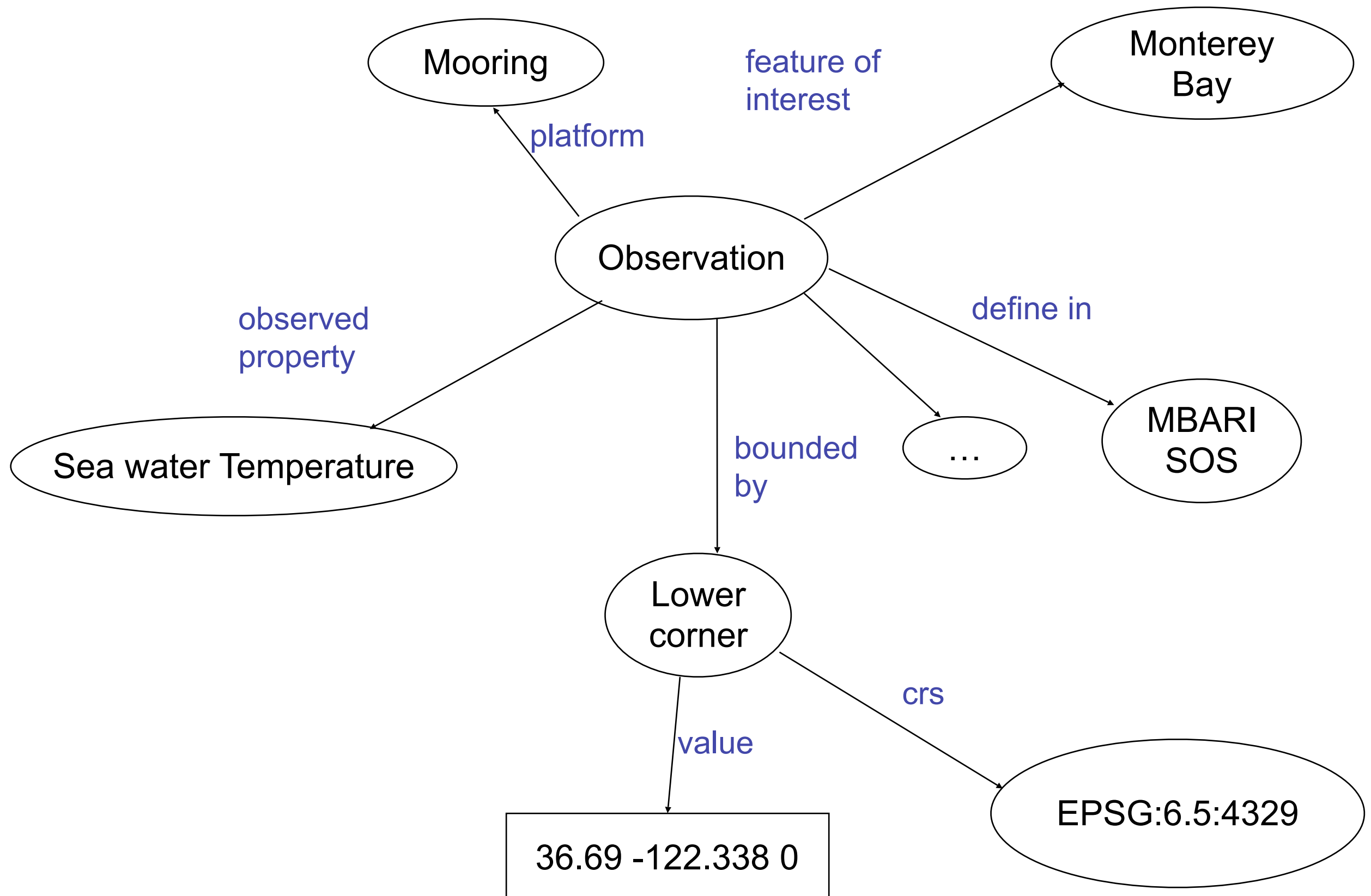
Harvester

Representation of original data model in Resource Description Framework (RDF)

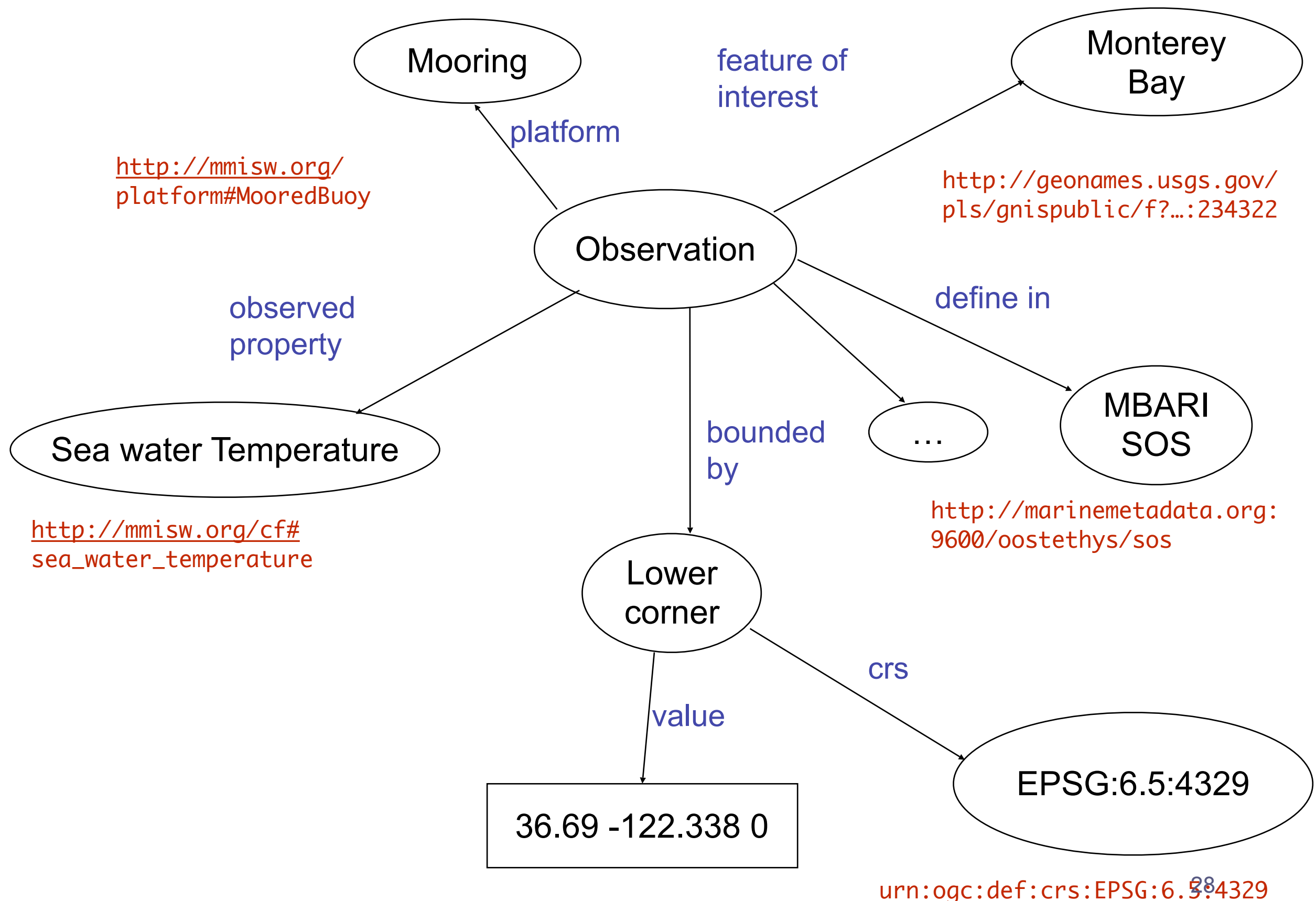
```
<rdf:Description rdf:about="http://motherlode.ucar.edu:8080/thredds/fileServer/station/motan/Surface_METAR_20001110_0000.nc">
  <cdm:Conventions rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
    Unidata Observation Dataset v1.0
  </cdm:Conventions>
  <cdm:geospatial_lat_max rdf:datatype="http://www.w3.org/2001/XMLSchema#float">
    90.0
  </cdm:geospatial_lat_max>
  <cdm:cdm_datatype rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
    Station
  </cdm:cdm_datatype>
  <cdm:longitude_coordinate rdf:datatype="http://www.w3.org/2001/XMLSchema#float">
    longitude
  </cdm:longitude_coordinate>
  <cdm:geospatial_lat_min rdf:datatype="http://www.w3.org/2001/XMLSchema#float">
    -90.0
  </cdm:geospatial_lat_min>
  <cdm:stationDimension rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
    station
  </cdm:stationDimension>
  <cdm:time_coordinate rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
    time_observation
  </cdm:time_coordinate>
  <cdm:time_coverage_end rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
    1258647840 seconds since 1970-01-01 00 UTC
  </cdm:time_coverage_end>
</rdf:Description>
```



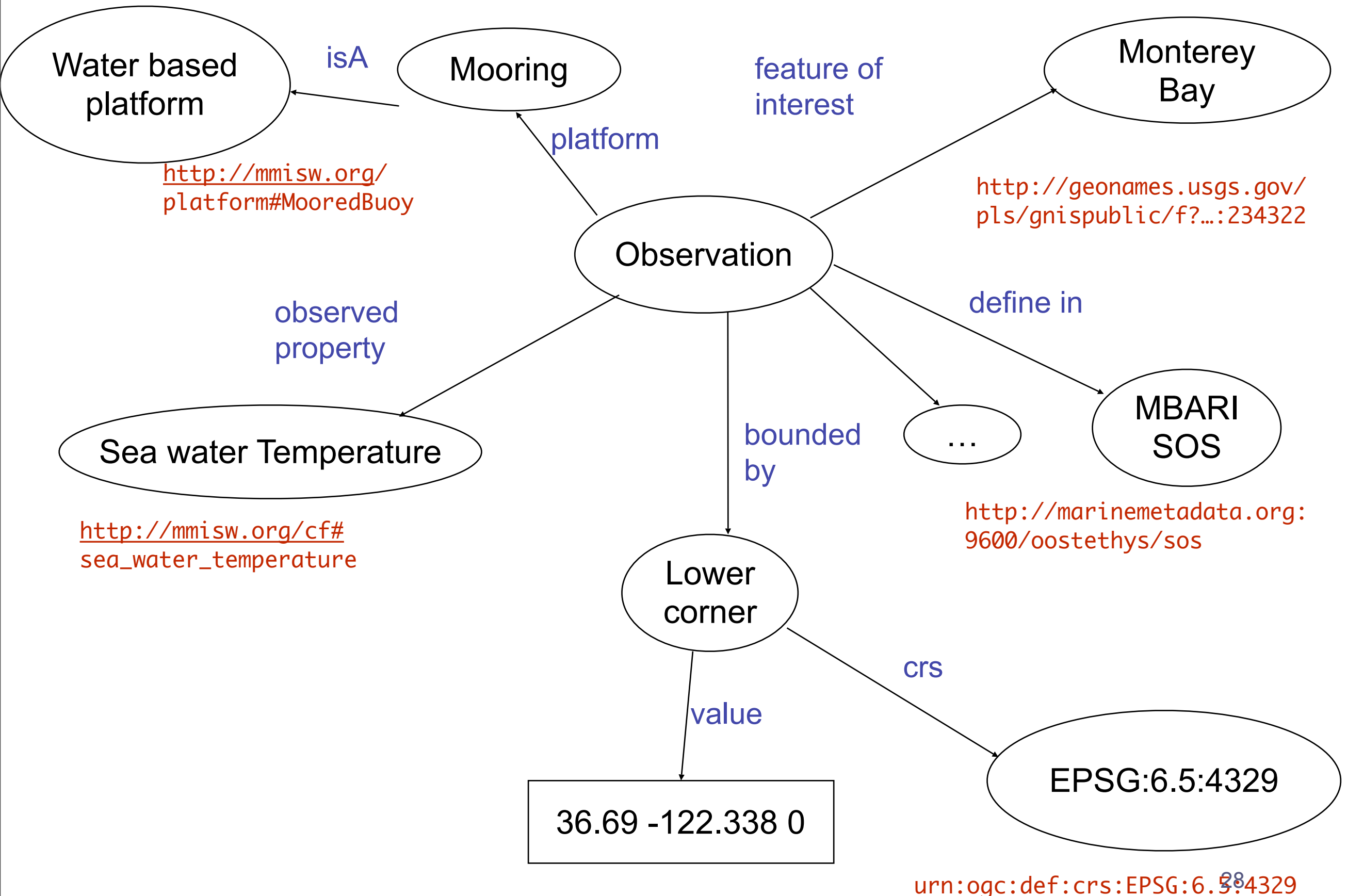
Observation graph in an RDF model?



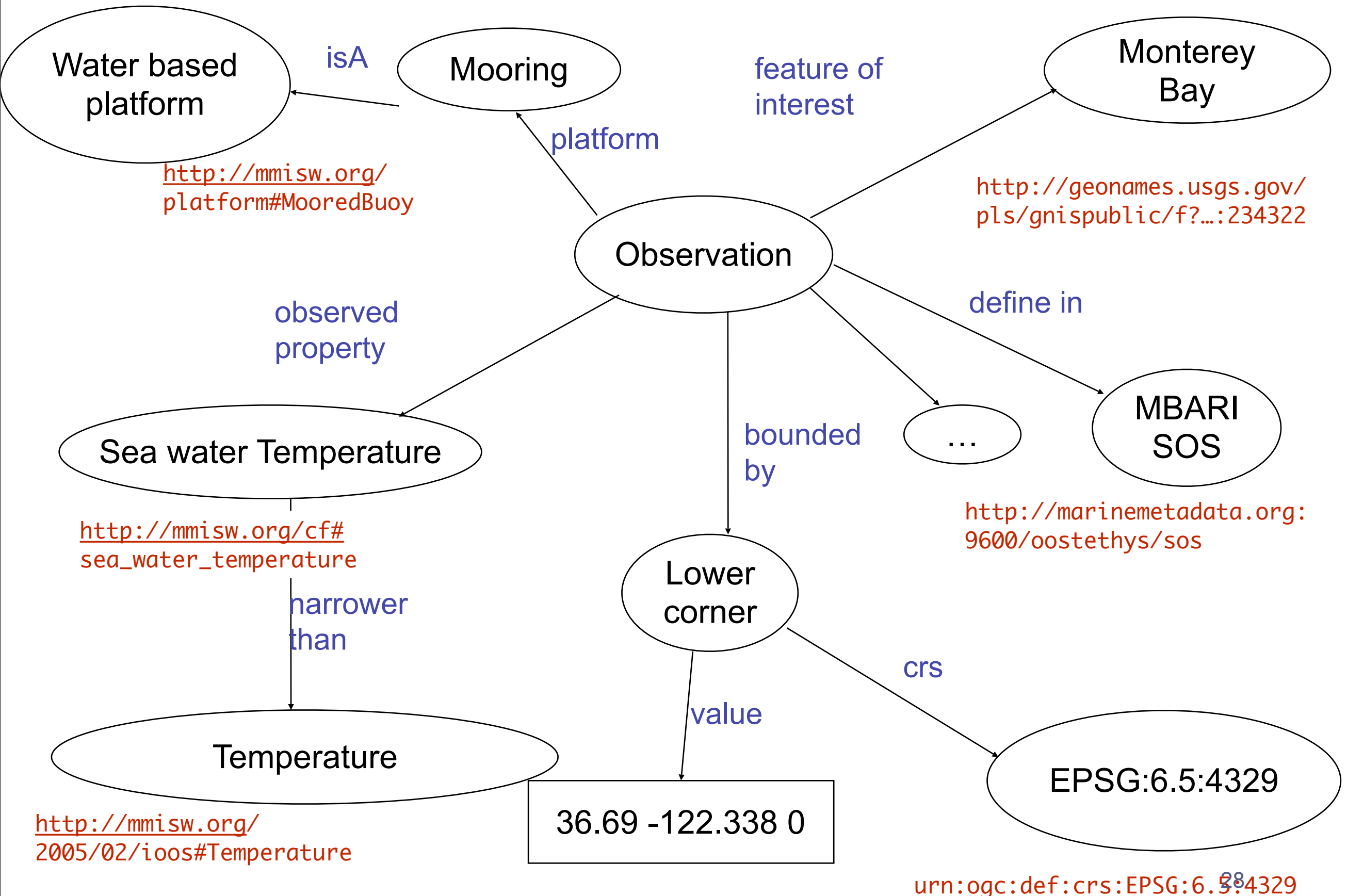
Observation graph in an RDF model?



Observation graph in an RDF model?



Observation graph in an RDF model?



Uniform Resource Identifier



“ Most fundamental web stuff ”

Tim Berners Lee

- <http://somehost/absolute/URI/resource.jpg>
- <ftp://somehost/resource.txt>
- <urn:issn:1535-3613>
- <mailto:infobot@ex.com?subject=subscribe>
- <SIN://16137224697>

Main Components

- Registry and Repository: Manages and stores, resources, triples, rules, mappings etc. Enables collaboration for maintaining ontologies.
- Harvester - reads metadata and data and converts it to RDF
- **Semantic Graph Builder** - builds RDF triples including instances from the harvester, rules, domain ontologies, ontology mappings etc
- Faceted Browser - Displays results organized by categories

Adds rules and mappings

[CF_Parameters_to_URI_and_are_observed_Properties:

(?dataset cdm:variable ?var)

strConcat("http://mmisw.org/ont/cf/parameter/", ?var, ?prop) ->

(?dataset om:observedProperty ?prop)]

Translation



Example using JENA rules

After applying inference

<[http://motherlode.ucar.edu:8080/thredds/
fileServer/station/metar/
Surface_METAR_20091007_0000.nc](http://motherlode.ucar.edu:8080/thredds/fileServer/station/metar/Surface_METAR_20091007_0000.nc)>

a

<<http://mmisw.org/ont/ooi-ci/om#Observation>> ,
rdfs:Resource ,
cdm:Dataset ;

Example using n3 syntax

After applying inference

<http://motherlode.ucar.edu:8080/thredds/fileServer/station/metar/Surface_METAR_20091007_0000.nc>

cdm:variable

"precipitation_amount", "snowfall_amount", "weather",
"numChildren", "cloud_area_fraction", "lastChild",
"cloud_base_altitude", "region", "air_temperature",
"wind_from_direction", "report", "pressure"



<<http://mmisw.org/ont/ooi-ci/om#observedProperty>>

"http://mmisw.org/ont/cf/parameter/visibility_in_air",
"http://mmisw.org/ont/cf/parameter/wind_from_direction",
"<http://mmisw.org/ont/cf/parameter/weather>"

Main Components

- Registry and Repository: Manages and stores, resources, triples, rules, mappings etc. Enables collaboration for maintaining ontologies.
- Harvester - reads metadata and data and converts it to RDF
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- **Faceted Browser** - Displays results organized by categories

Faceted Browser

The screenshot displays the Faceted Browser interface with three facet panels at the top and an information panel below them.

Contact Organization

- NOAA National Data Buoy Center
- Monterey Bay Aquarium Resea..

Observed Property

- Sea Water Salinity
- Sea Water Pressure
- Sea Water Temperature
- Sea Water Electrical Conductivity
- Depth
- Longitude
- Latitude
- Time
- Quality Flag

Observation

- OS_M0_20050418_TS.nc
- OS_M0_20040603_TS.nc
- OS_M0_20050418_TS.nc

Information Panel

ID: OS_M0_20040603_TS.nc
Title: Gridded 10 minute MBARI Mooring M1 Sea Water Temperature and Salinity Observations
URL: http://elvis.shore.mbari.org/thredds/fileServer/my/test/all/OS_M0_20040603_TS.nc
Area: Eastern Pacific Ocean

Observed Property: [Sea Water Salinity](#)
Observed Property: [Sea Water Pressure](#)
Observed Property: [Sea Water Temperature](#)
Observed Property: [Sea Water Electrical Conductivity](#)
Observed Property: [Depth](#)
Observed Property: [Longitude](#)
Observed Property: [Latitude](#)
Observed Property: [Time](#)
Observed Property: [Quality Flag](#)

Author: [Fred Bahr](#)
Contact Email: flbahr@mbari.org
Contact Organization: [Monterey Bay Aquarium Research Institute](#)

Ontology editors draft evaluation

	CollabProtégé	Sem Media Wiki	MMI ORR	BioPortal	Knoodle	MyKnoodle	
easy of modification	✓	✓	i	i			
ability to collaborate	✓	✓	no groups	✓	✓	✓	
fidelity of transactions		✓	✓	✓			
level of metadata	✓	✓	✓				
interop with repository	✓	✓	✓	no			
SPARQL query			✓		✓	✓	
Inference			RDFS++	RDFS?	no	Krule?	
user given rules			no	no	no	Krule?	
open source	✓		✓		no	no	
free	✓	✓	✓	✓	✓	no	

<http://www.oceanobservatories.org/spaces/display/CIDev/Review+of+online+ontology+editors>

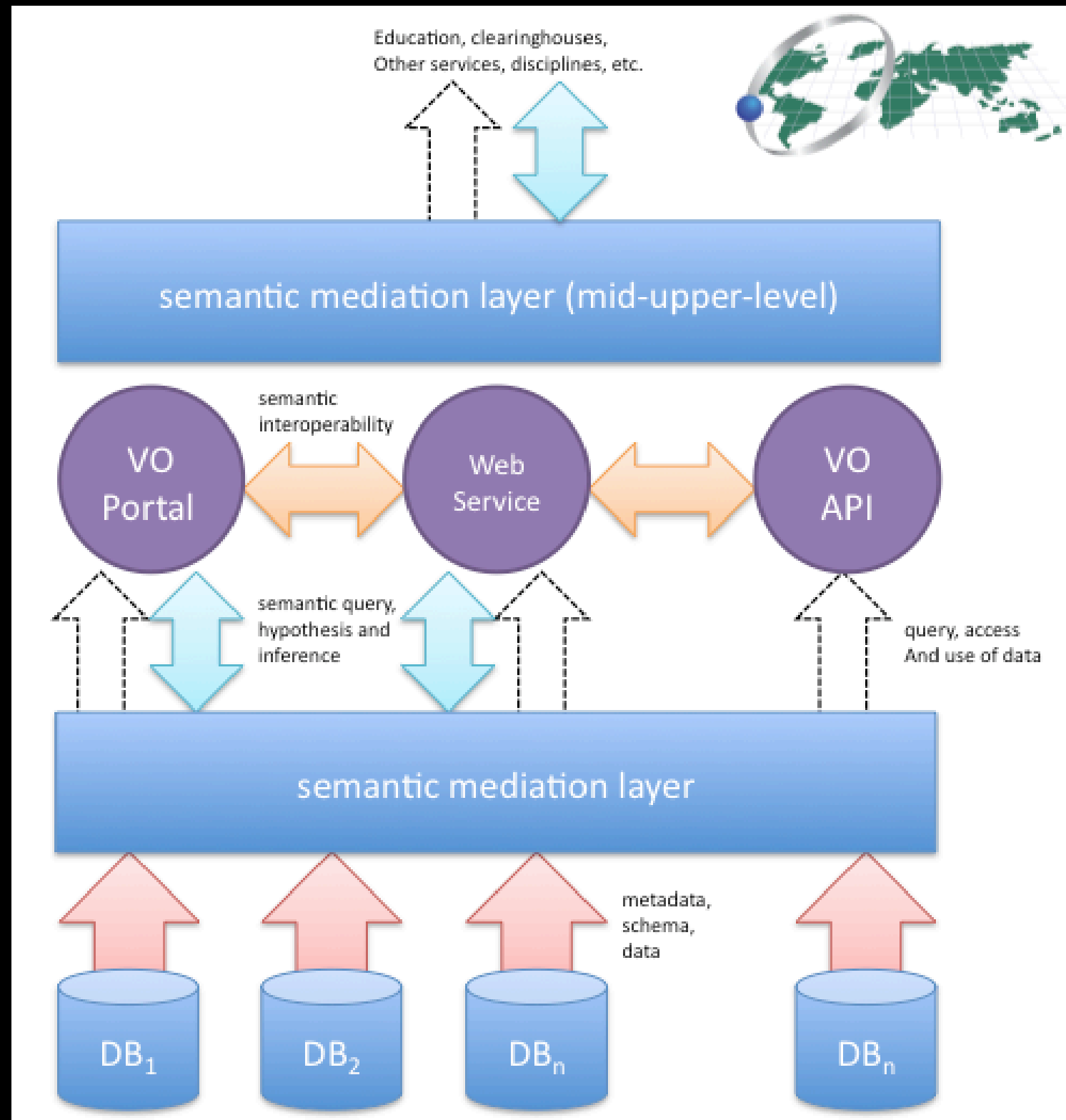
Other Projects

Tetherless World Constellation Semantic eScience Framework

faceted browser

conversion to
inference graph

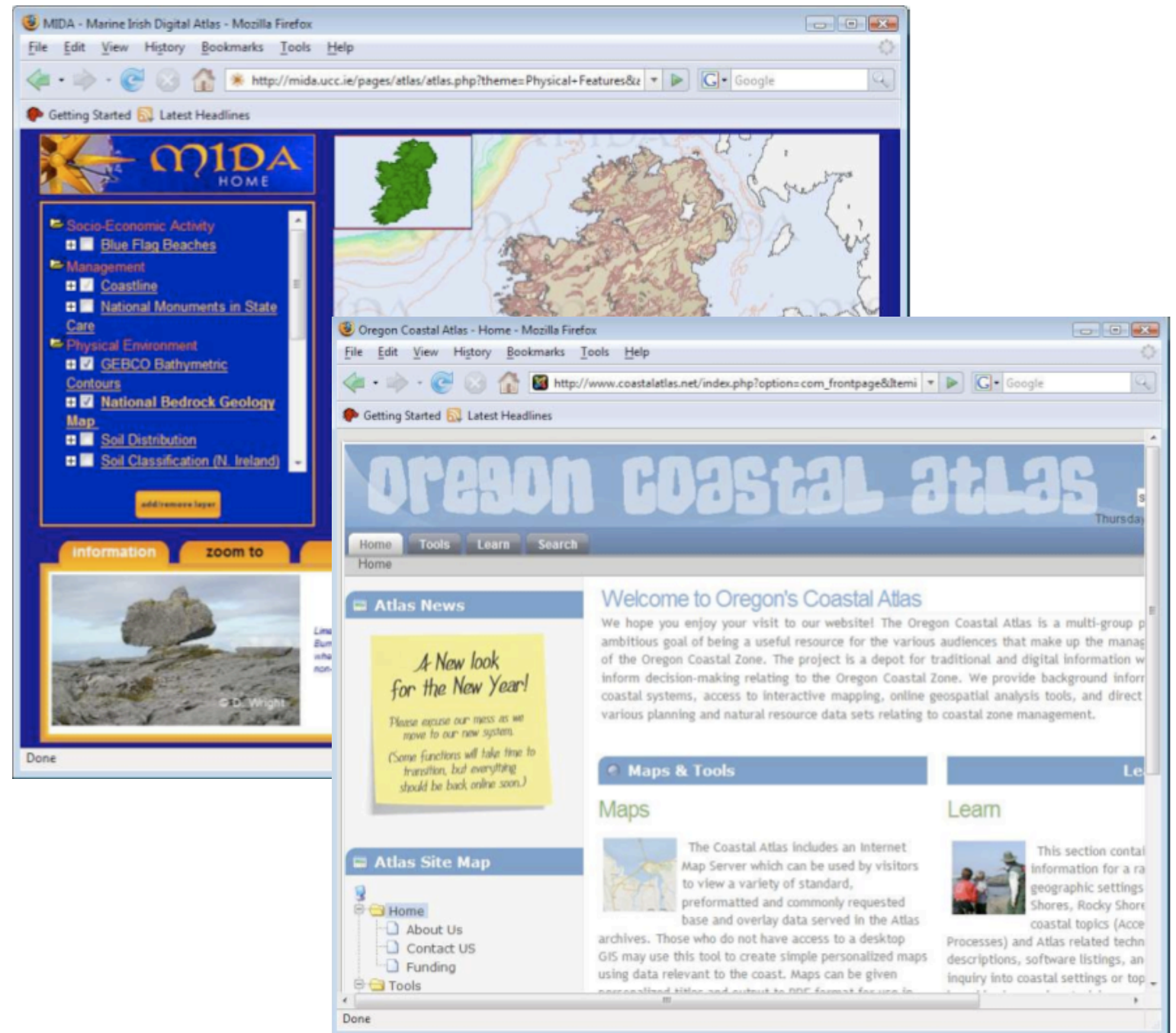
harvesting



<http://tw.rpi.edu/portal/SESF>



30 organizations
from over a
dozen nations



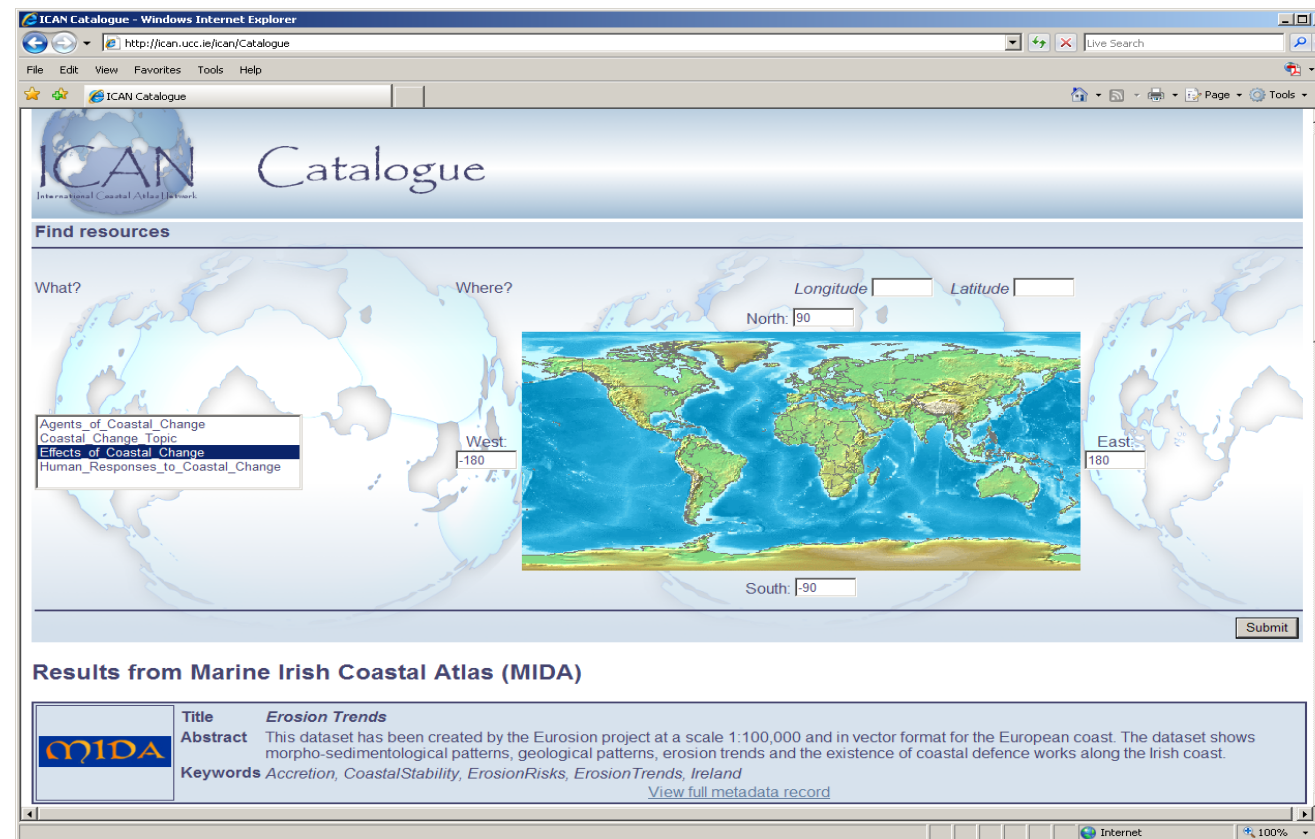
Semantic Mediation across
coastal web atlases

<http://ican.ucc.ie>

Architecture

faceted browser
conversion to
inference graph

harvesting



...

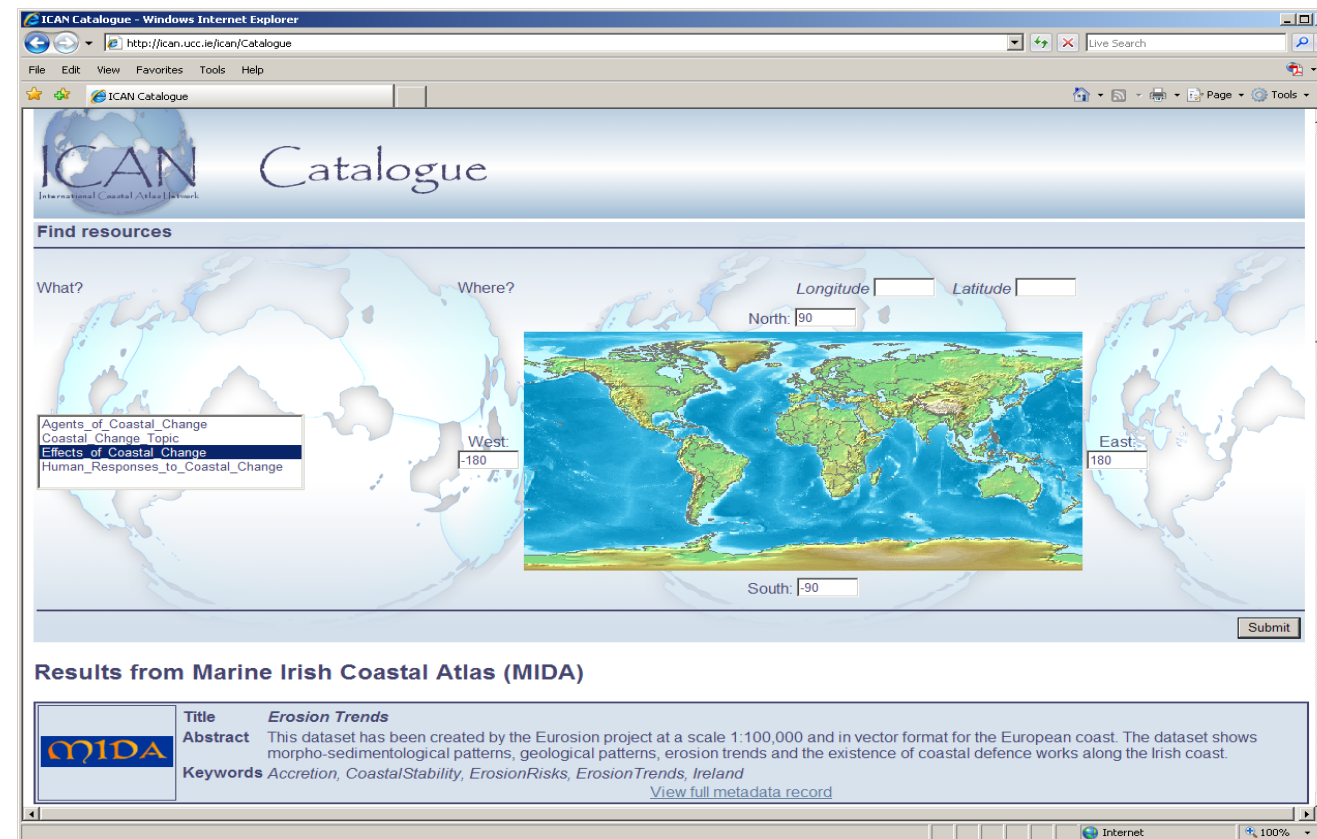


Architecture

faceted browser
conversion to
inference graph

ICAN Ontology

harvesting



MIDA Ontology

OCA Ontology

X Ontology



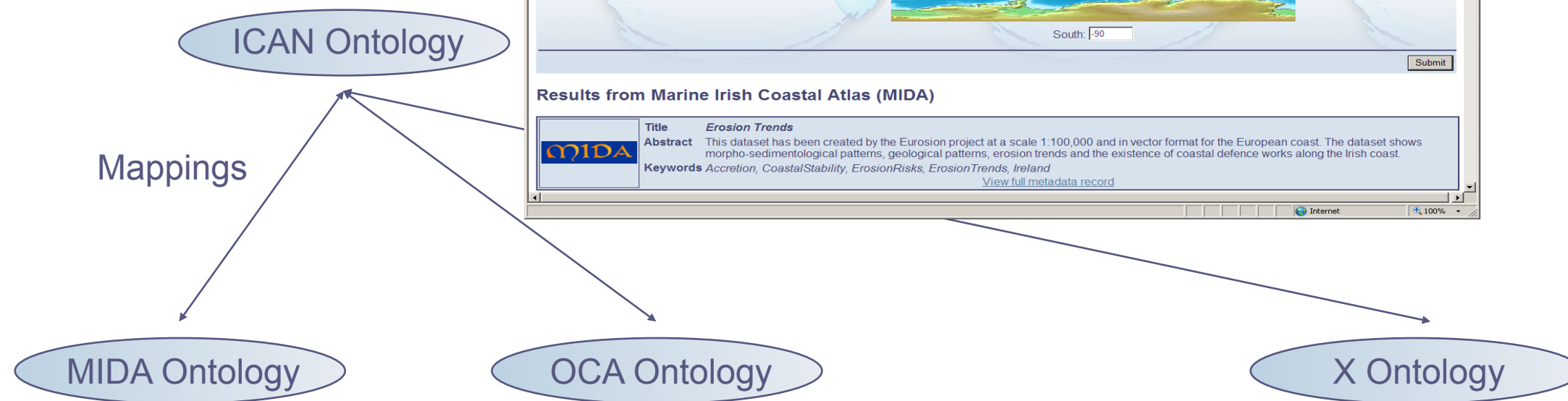
...



Architecture

faceted browser
conversion to
inference graph

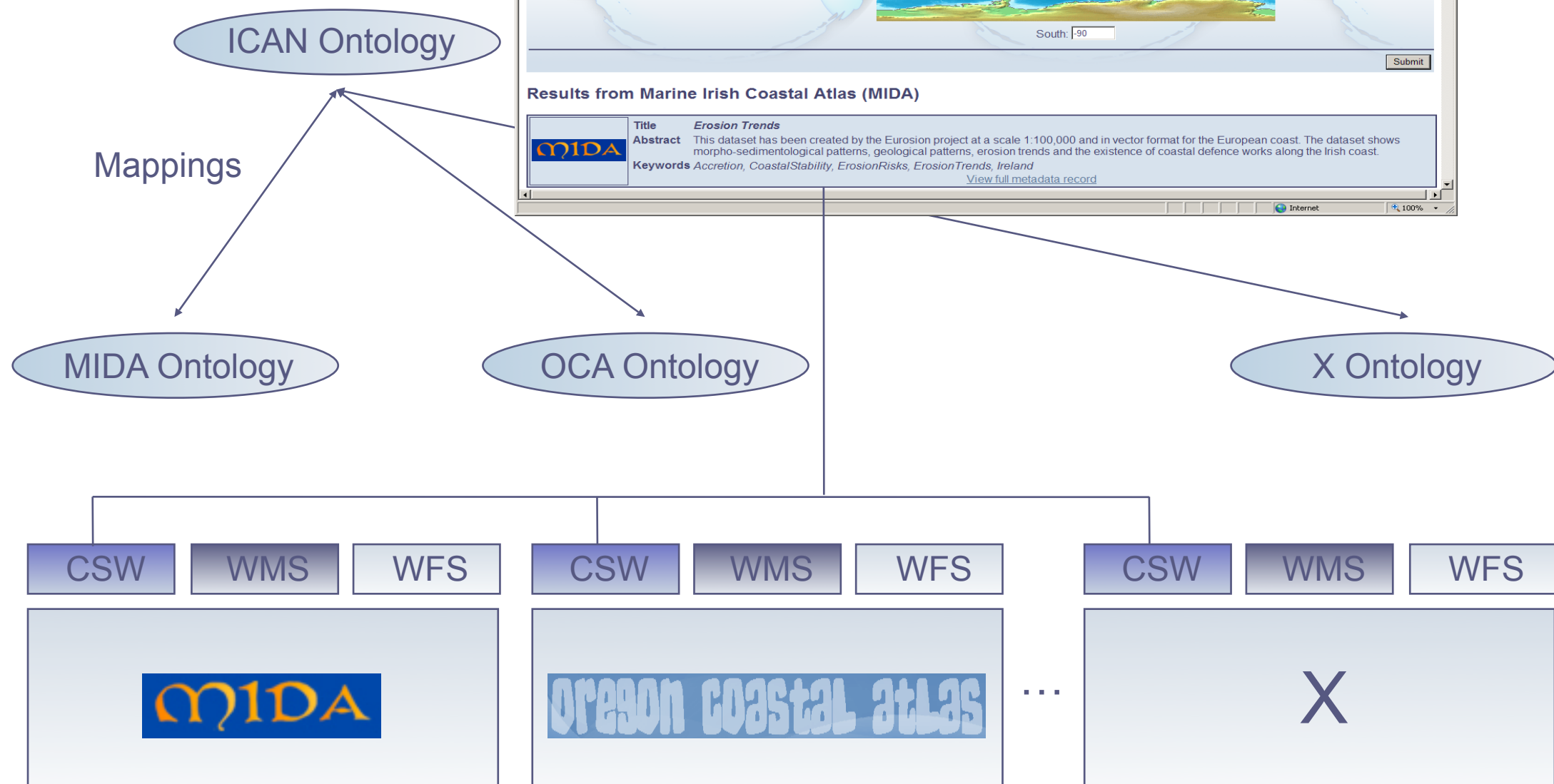
harvesting



Architecture

faceted browser
conversion to
inference graph

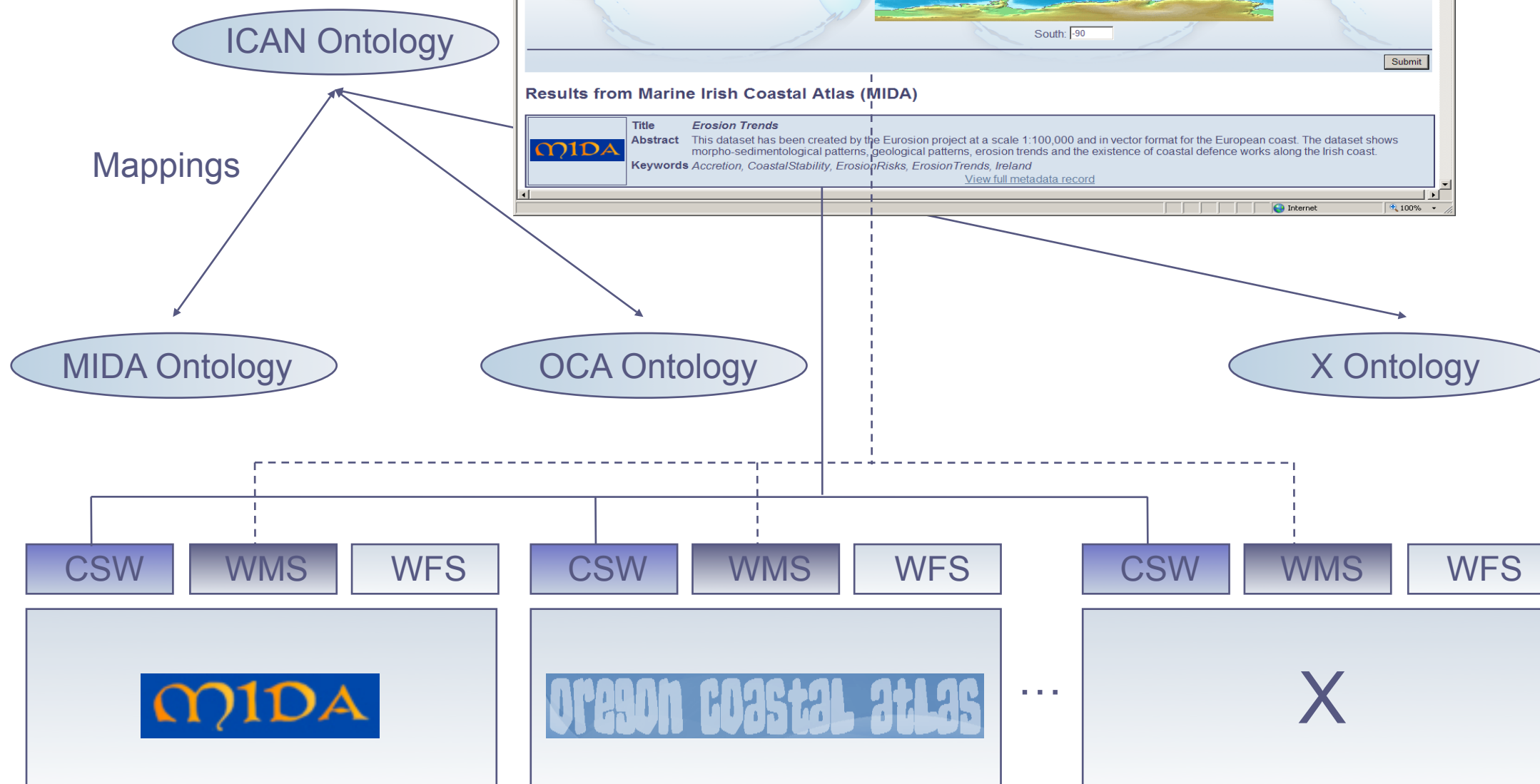
harvesting



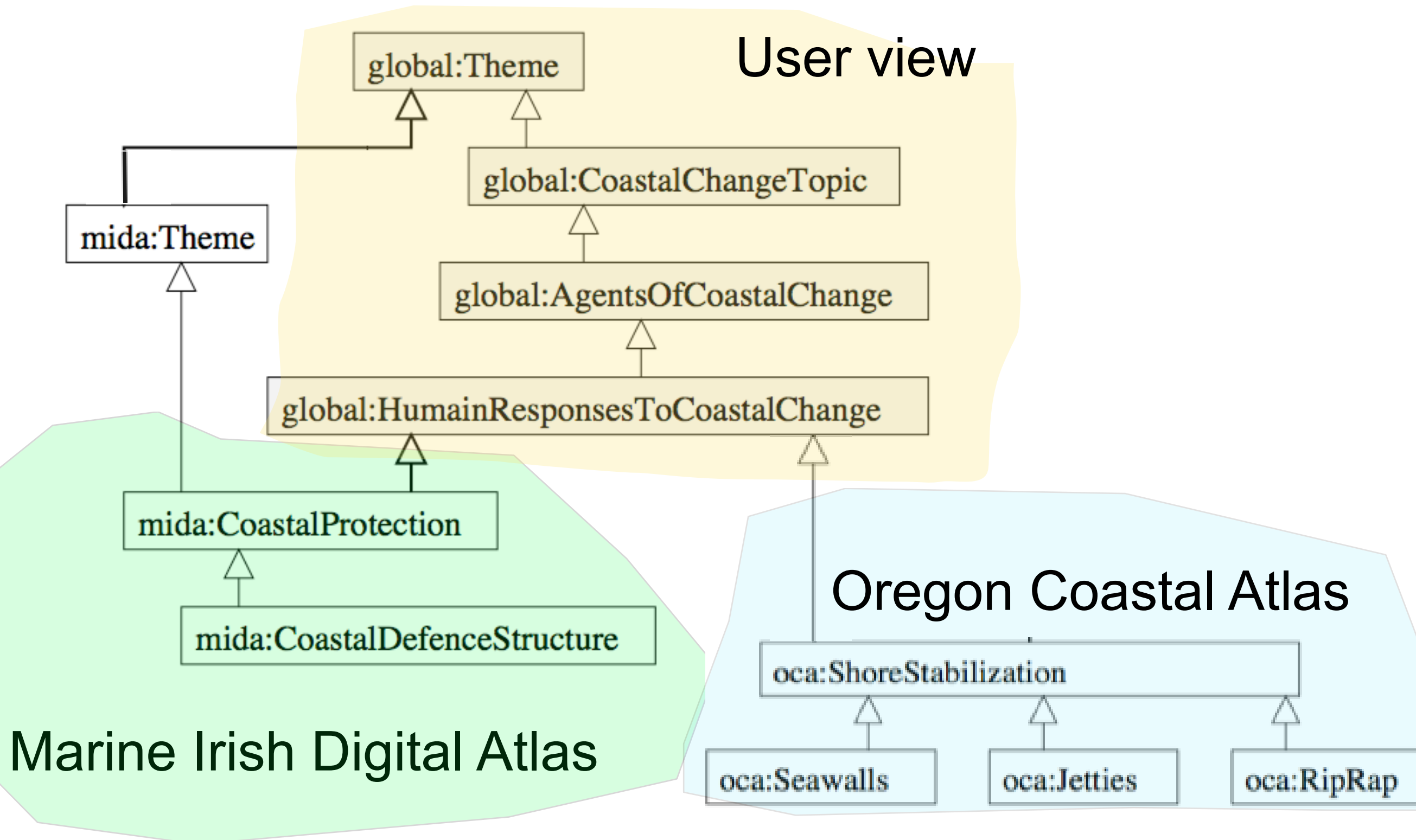
Architecture

faceted browser
conversion to
inference graph

harvesting



Mapping Layer Themes

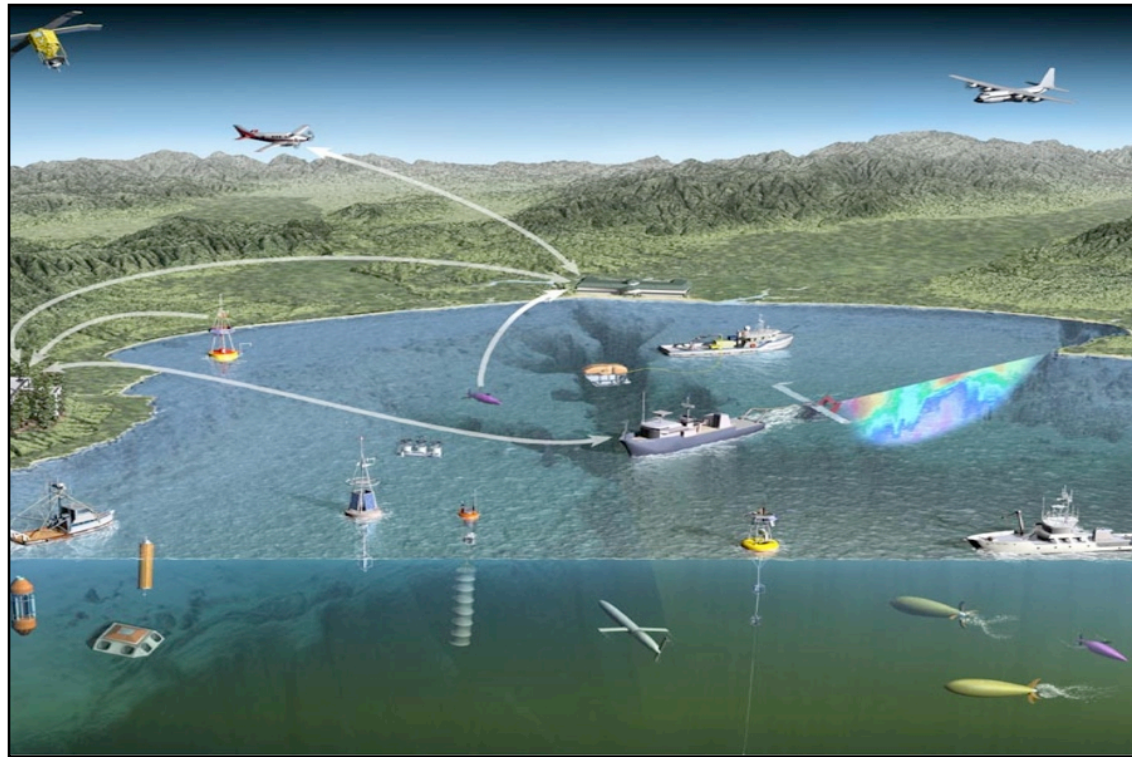


Tagging Web Services with ontologies makes life easier

```
<gmd:descriptiveKeywords>
  <gmd:MD_Keywords>
    <gmd:keyword>
      <gmx:Anchor
        xlink:href="http://www.coastalatlantlas.net/ont/20071016/coastalatlantlas#ShoreStabilization">
        Shore Stabilization</gmx:Anchor>
      </gmd:keyword>
    </gmd:MD_Keywords>
  </gmd:descriptiveKeywords>
```

Example response to "describeRecord" SOS operation
Catalogue Services for the Web (CSW) - ISO 19139 profile

OGC Ocean Science Interoperability Experiment

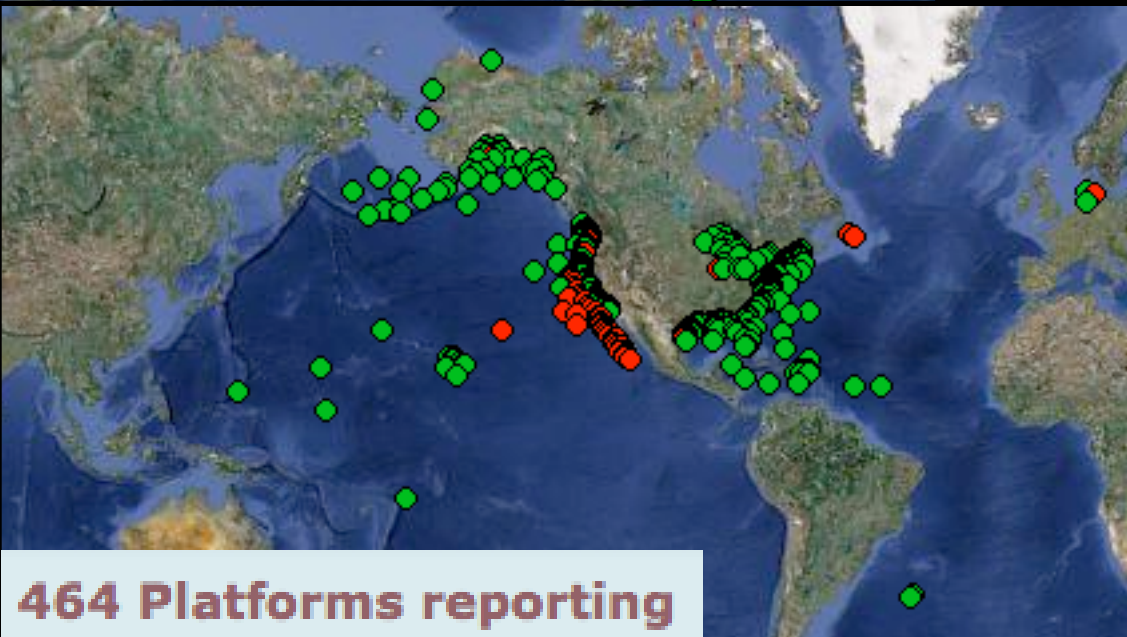
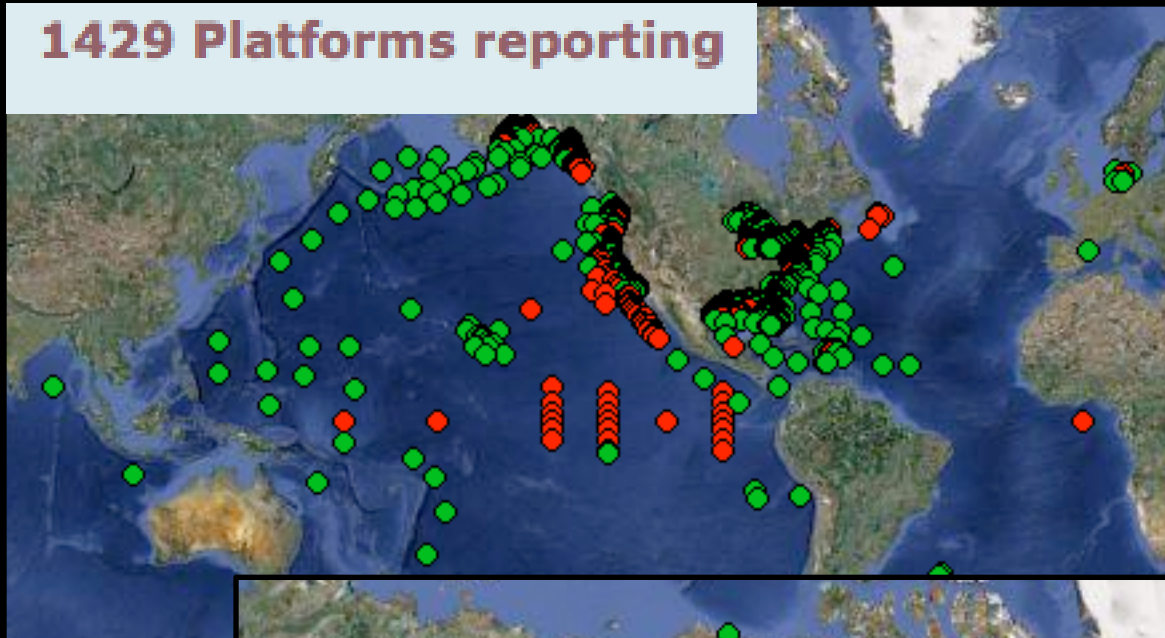


OGC World initiative to advance standards for advancing interoperability of ocean observing systems.



Sensor Observation Services (SOS) categorized for the OGC Oceans IE / OOSTethys

1429 Platforms reporting



464 Platforms reporting

IOOS Variables:

Sea Water Temperature

Mapped to:

sea_water_temperature

Temperature

temperature

R_TEMP

watertemperature

WATER_TEMP

WaterTemperature

Sea_Surface_Temp

SST

seaWaterTemperatureInDegreesCelsius

Hydroseek

faceted browser

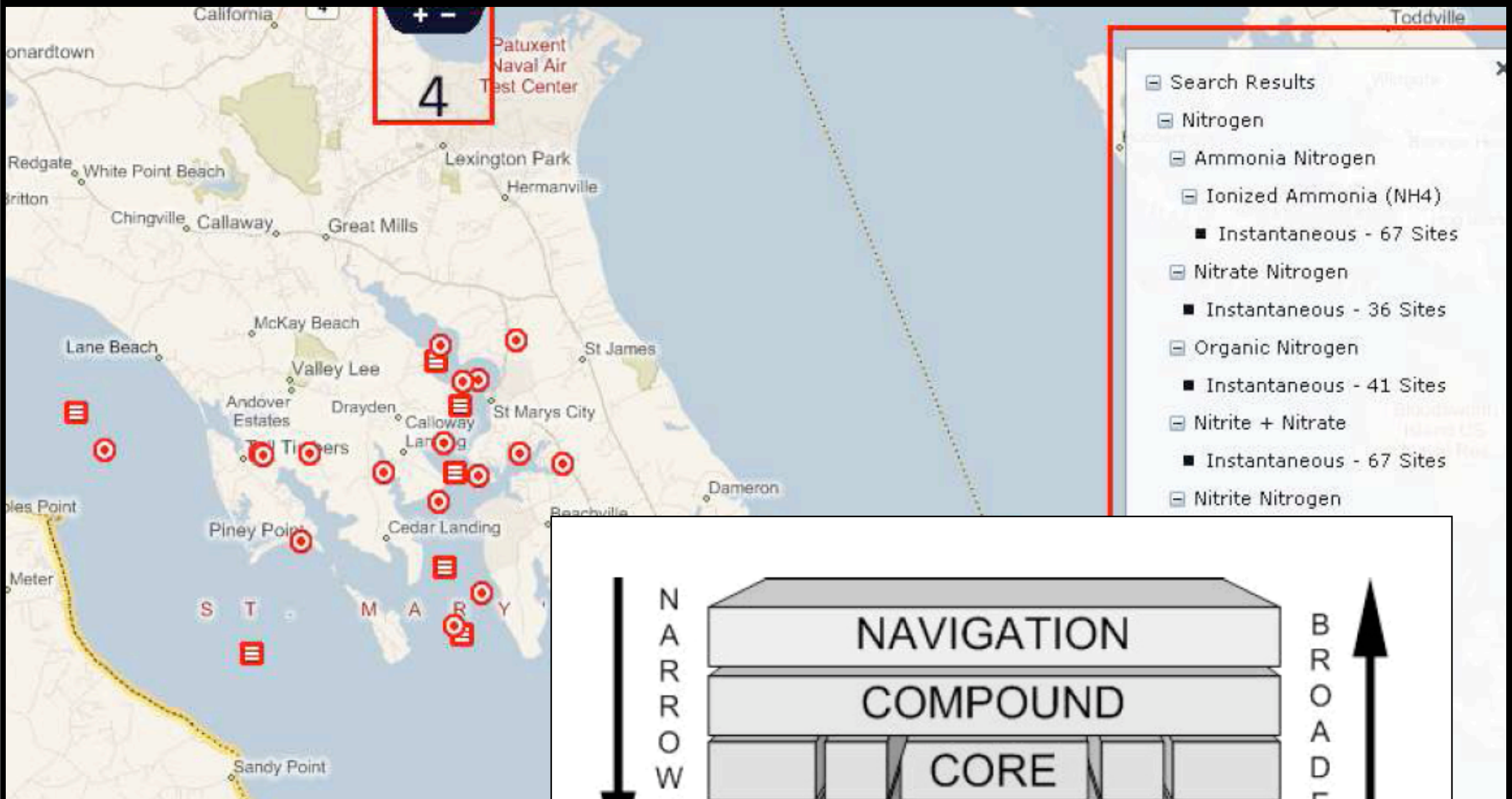
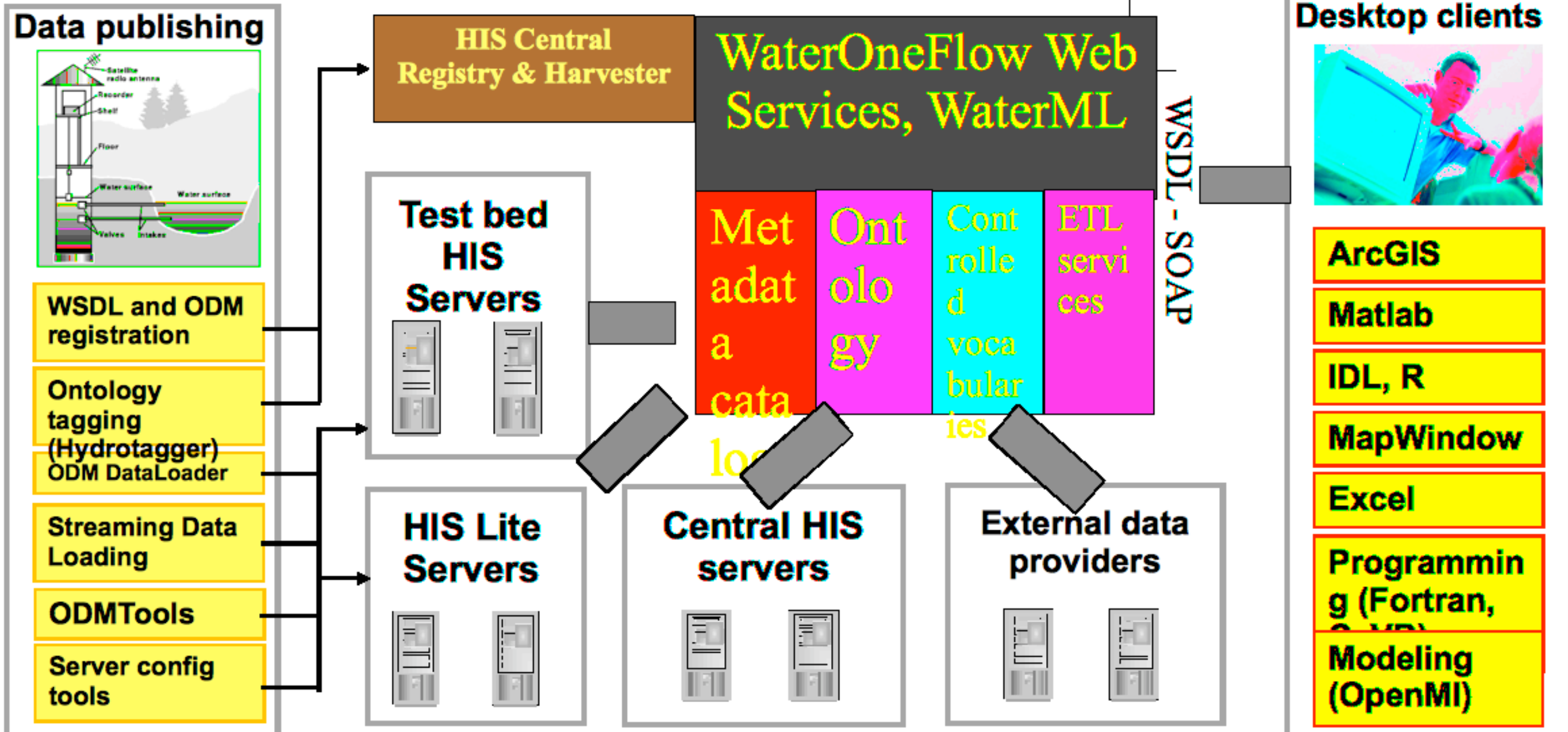


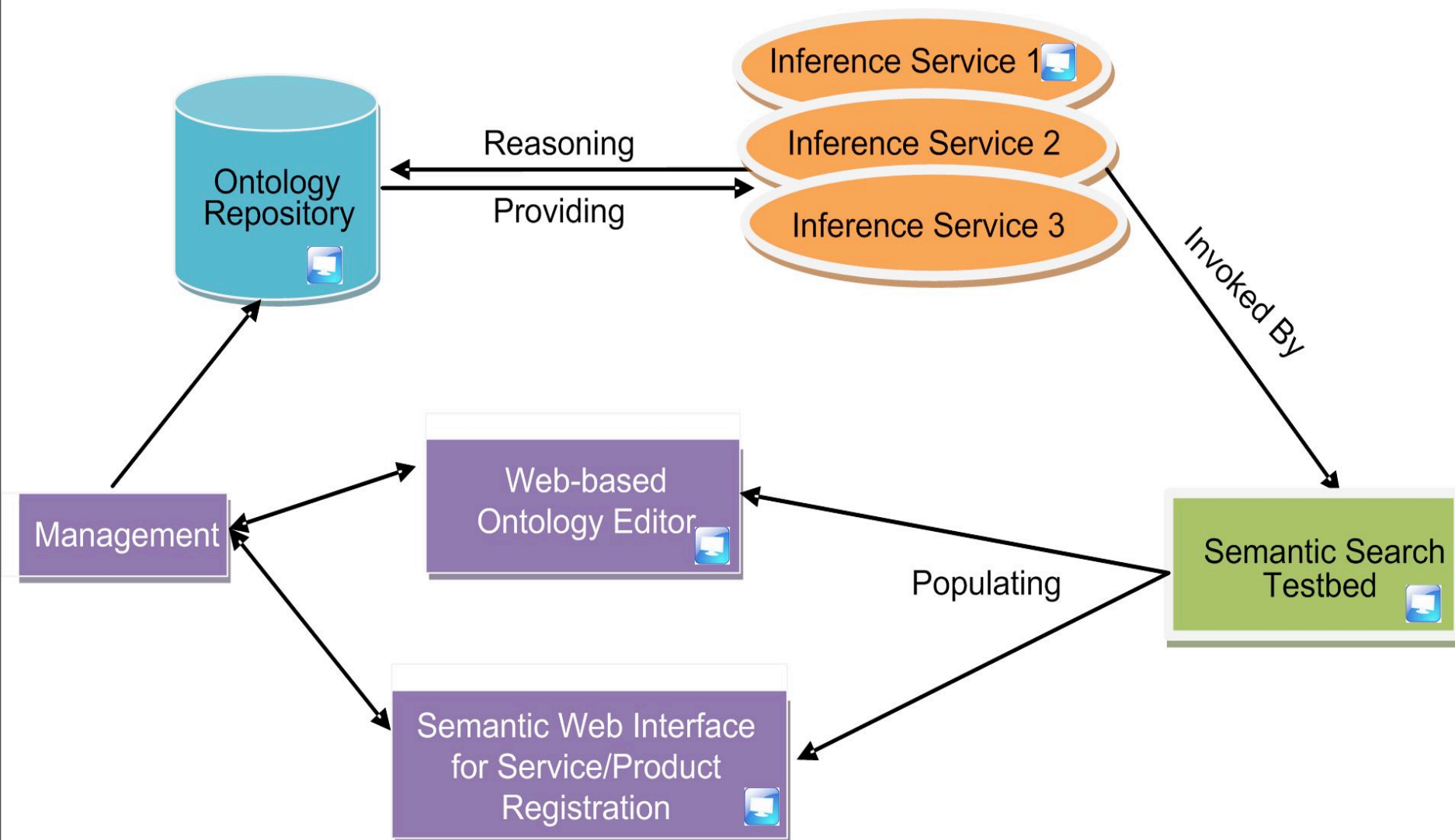
Figure 4.1. Layered ontology model used in the system



ESIP Semantic Web Testbed

- Find all the precipitation datasets that are distributed through “HTTPServer” and have the encoding format “Binary”?
- Search water related dataset/services simultaneously from popular catalogues, e.g. GCMD, NCDC, GOS, ECHO, ESG.

Architecture



Technical Specifications:

- Open source framework **Sesame** 2.3 and **MySQL** 5.0 are used as backend ontology repository.
- Apache **Tomcat** 5.5.28 and Axis 1.2 are used to deploy inference services
- **Web Protégé** is used as web-based ontology editor.
- Java **servlet** and **Ajax** are used to develop online interface for semantic registration.

Prototype available at: <http://testbed.gmu.edu/swtestbed>

GUI-Web-based Ontology Editor

ESIP Semantic Web Testbed

Testbed Scenario

Semantic Registration

Semantic Search

Collaborative Development

[Send us feedback!](#) [Documentation](#) | [Protégé](#)

My WebProtégé

ESIPDatatype

Classes

Properties

Individuals

Notes and Discussions

Metadata

Ontology: ESIPDatatype. Search:

[Login](#) for more features.

[Save Layout](#)

Ad

Class Tree

Create Delete

- owl:Thing
 - Algorithm
 - ByteOrderType
 - CoordinateReferenceSystem
 - DataCompressionType
 - DataField
 - DataFormat
 - DataSet**
 - DataCollection
 - DataGranule
 - ObservationSet
 - DistributionSource
 - FGDC_AltitudeDatumName
 - FGDC_AltitudeEncoding
 - FGDC_DepthDatumName
 - FGDC_DepthEncodingMethod

Properties for DataSet

Add property value Delete property value

Property	Value
fromDistributionSource	DistributionSource
hasDataField	DataField
hasDataFormat	DataFormat
hasDistributionSource	DistributionSource
hasProductionMethod	ProductionMethod

Axioms for DataSet

GUI-Direct RDF Registration

ESIP Semantic Web Testbed

Testbed Scenario

Semantic Registration

Semantic Search

Collaborative Deve

Semantic Registration Workflow

Semantic Registration

Input Ontology Fragment

Conducting Query

1

Input Step 1 of 2: Input Ontology Fragment

Metadata:

Head:

Input RDF Fragment *:

```
<?xml version="1.0"?>
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-
  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns="http://testbed.gmu.edu/esip/datatype.owl#"
  xml:base="http://testbed.gmu.edu/esip/datatype.owl">
```

```
<Valida rdf:ID="Valida_9"/>
<MeasuredRadiance rdf:ID="MeasuredRadiance_10"/>
<FGDC_LocalReferenceSystem rdf:ID="FGDC_LocalReference
<Spectrum rdf:ID="Spectrum_15"/>
<TemporalCoverage rdf:ID="TemporalCoverage_6"/>
<ProductionMethod rdf:ID="ProductionMethod_16"/>
<DataField rdf:ID="dfTest1">
  <hasSpatialCoverage>
    <BoundingBox rdf:ID="BoundingBox_1">
      <hasLeftBound rdf:datatype="http://www.w3.org
/2001/XMLSchema#float">0.0</hasLeftBound>
      <byFGDCSpatialReferenceObject rdf:resource="http
/esip/datatype.owl#FGDC_SR_Raster"/>
      <hasUpperBound rdf:datatype="http://www.w3.org
/2001/XMLSchema#float">0.0</hasUpperBound>
      <hasLowerBound rdf:datatype="http://www.w3.org
/2001/XMLSchema#float">0.0</hasLowerBound>
```


GUI- Runtime Search and Registration

ESIP Semantic Web Testbed

Testbed Scenario

Semantic Registration

Semantic Search

Collaborative Development

Title: [NCDC: SSM/I Detailed Information: Cloud Liquid Water](#)

Source: [ncdc](#)

OnlineAccessible: yes

Description: Some NCDC systems will be unavailable Saturday, June 7, from 6:00 am EST until 4:00 pm DOC > NOAA > NESDIS > NCDC Search Field: ... Cloud Liquid Water. ...

data

Title: [NCDC: SSM/I Detailed Information: Cloud Liquid Water](#)

Source: [ncdc](#)

OnlineAccessible: yes

Description: Some NCDC systems will be unavailable Saturday, June 7, from 6:00 am EST until 4:00 pm DOC > NOAA > NESDIS > NCDC ... Total Precipitable Water. ... Overview. ...

data

Title: [The relationship of modern plant remains to water depth in ...](#)

Source: [ncdc](#)

OnlineAccessible: yes

Description: ... PALEOLIMNOLOGY. The relationship of modern plant remains to water depth in alkaline lakes in New England. ...

data

Title: [Denniston et al. 1999 Cold Water Cave Iowa Stalagmite Stabl...](#)

Source: [ncdc](#)

OnlineAccessible: yes

Resources

- ☒ NOAA NCDC - 10 ✓
- ☒ NASA GCMD - 15 ✓
- ☒ FGDC GOS - 0 ⚠
- ☒ NASA ECHO - 4 ✓
- ☒ NASA ESG - 0 ✓

Refine Your Search Here:

+Physical Substance

+water

- ☐ Solid Water
- ☐ Liquid Water
- ☐ Whatever Water
- ☐ Water Vapor

add parent node(s)

add child node(s)

add sibling node(s)



Conclusions

Better define where do we need to provide semantic tagging of data metadata:

- provider
- client
- other - shared semantic data center ?

Conclusions

Home for inference graph:

- provider
- client
- other - shared semantic data center ?

Need to enable in parallel automatic vs human concepts mapping

IOOS Variables:

Sea Water Temperature

Mapped to:

sea_water_temperature

Temperature

temperature

R_TEMP

watertemperature

WATER_TEMP

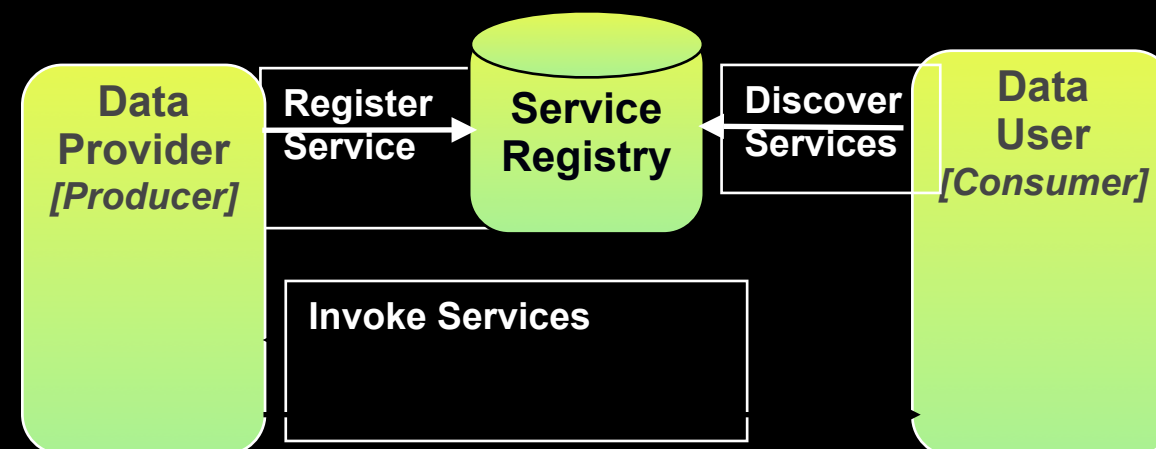
WaterTemperature

Sea_Surface_Temp

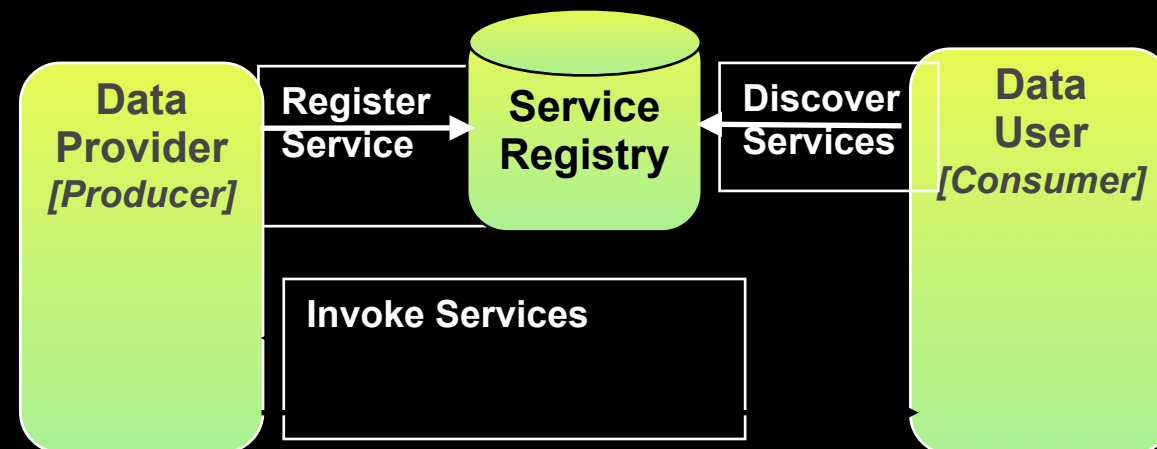
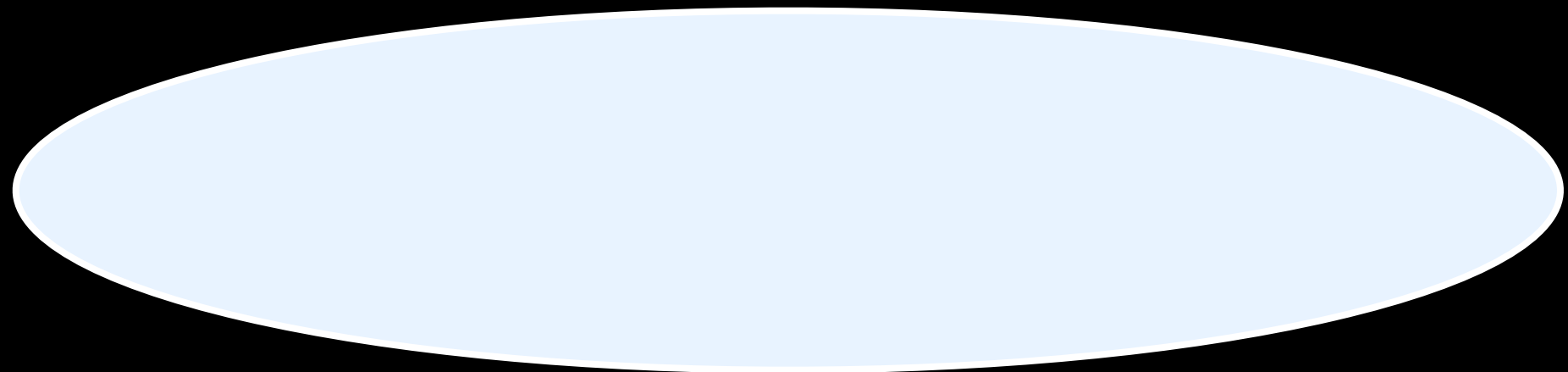
SST

seaWaterTemperatureInDegreesCelsius

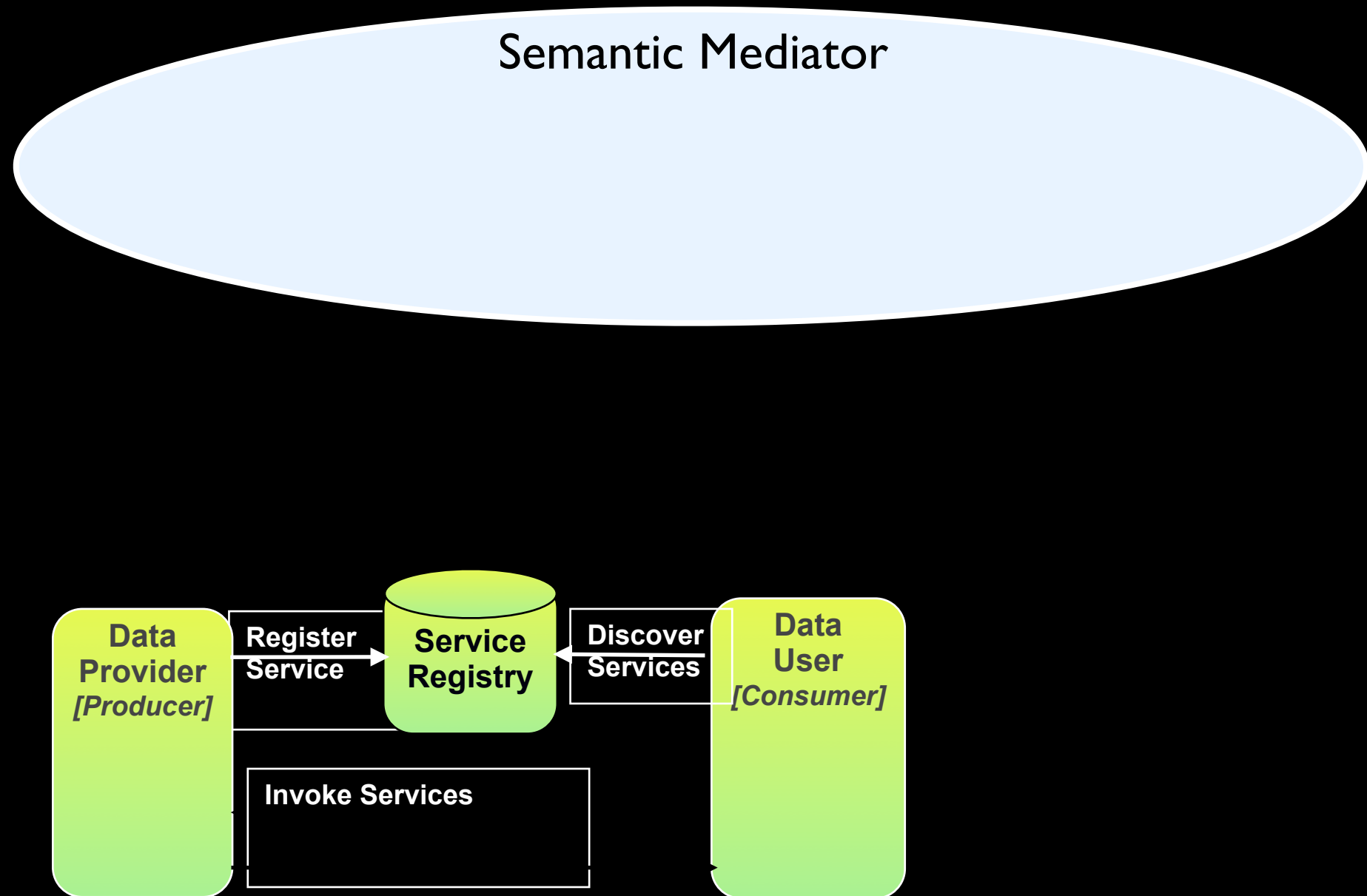
Improve registry services by using them more, making your tools more flexible



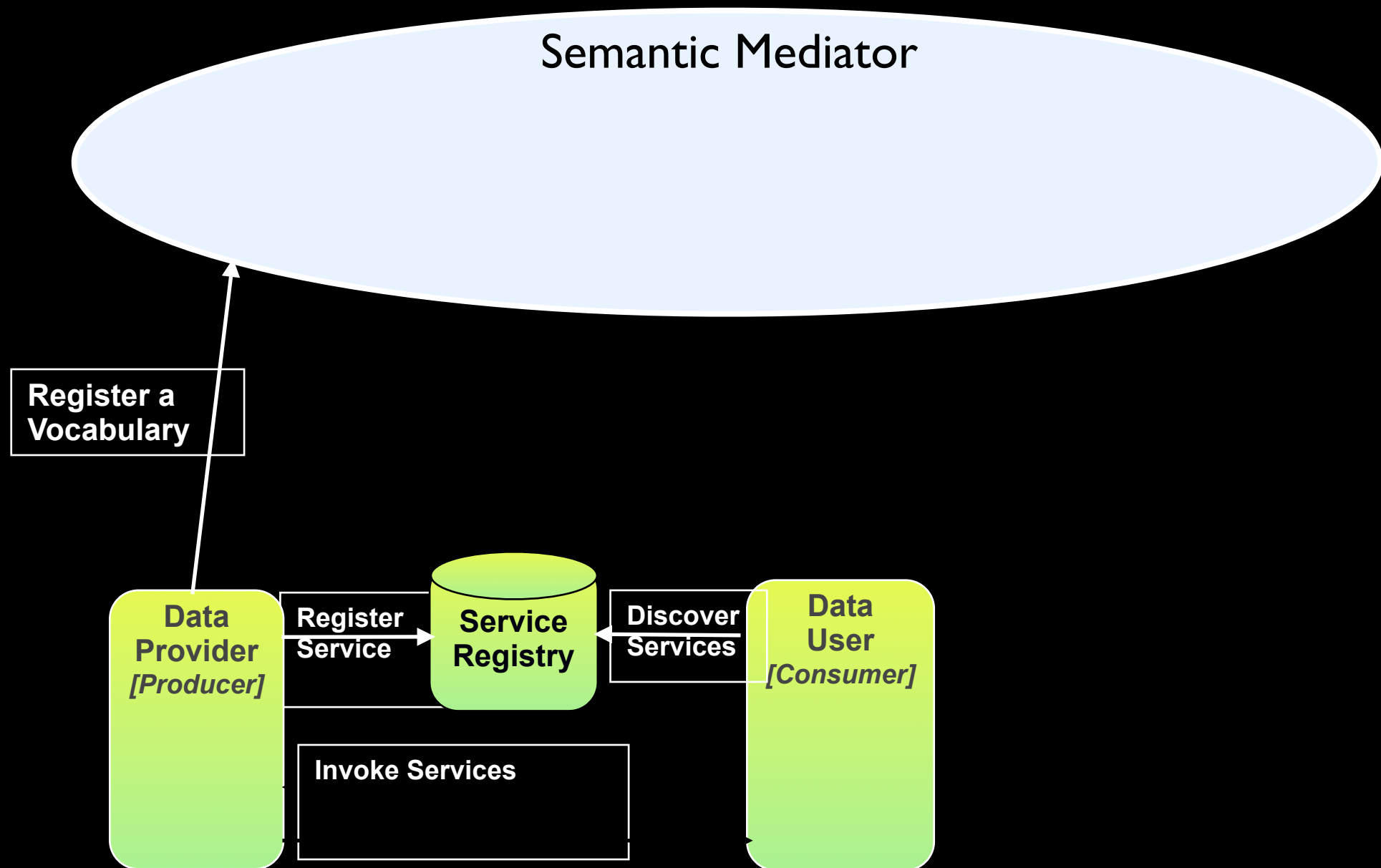
Improve registry services by using them more, making your tools more flexible



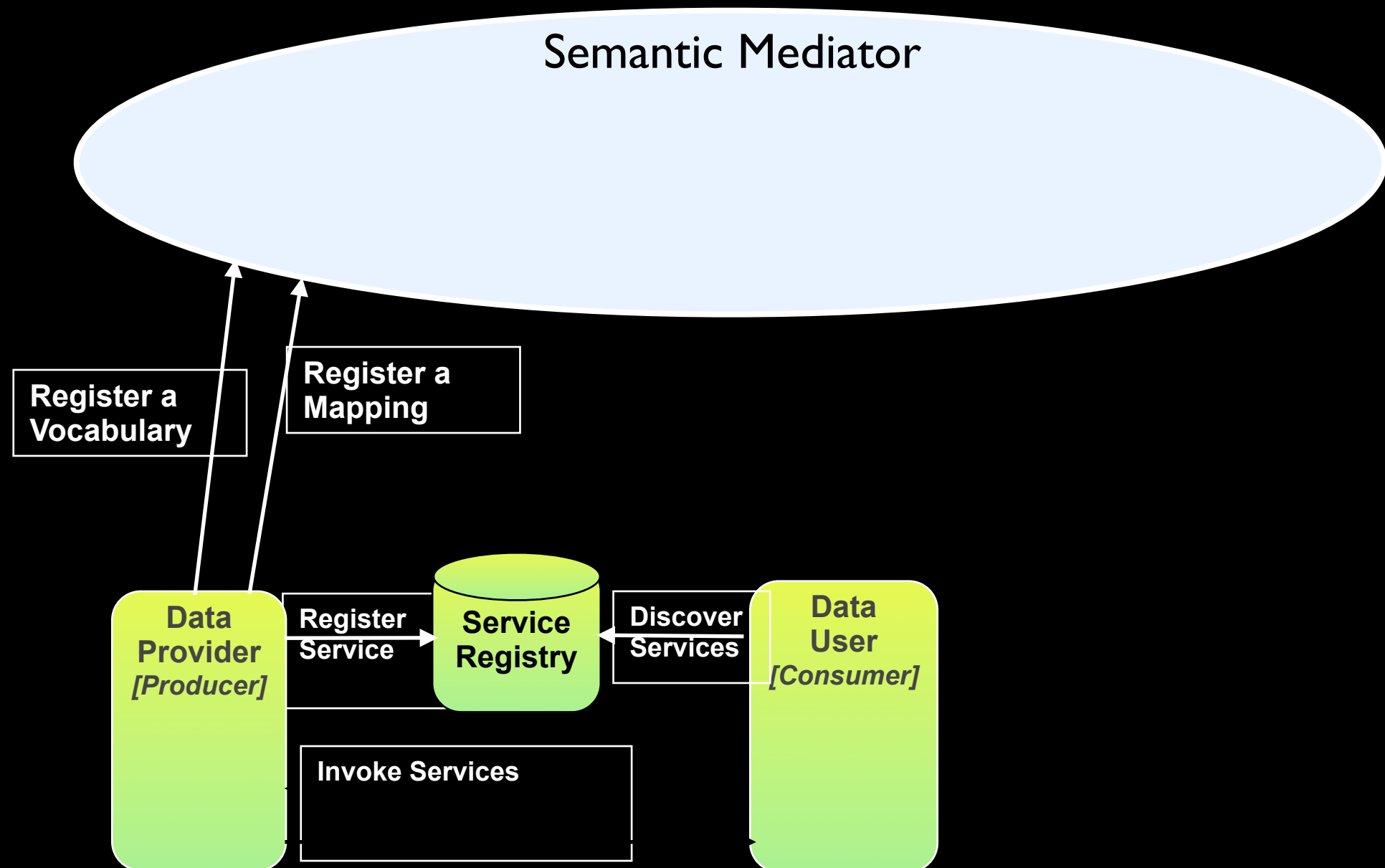
Improve registry services by using them more, making your tools more flexible



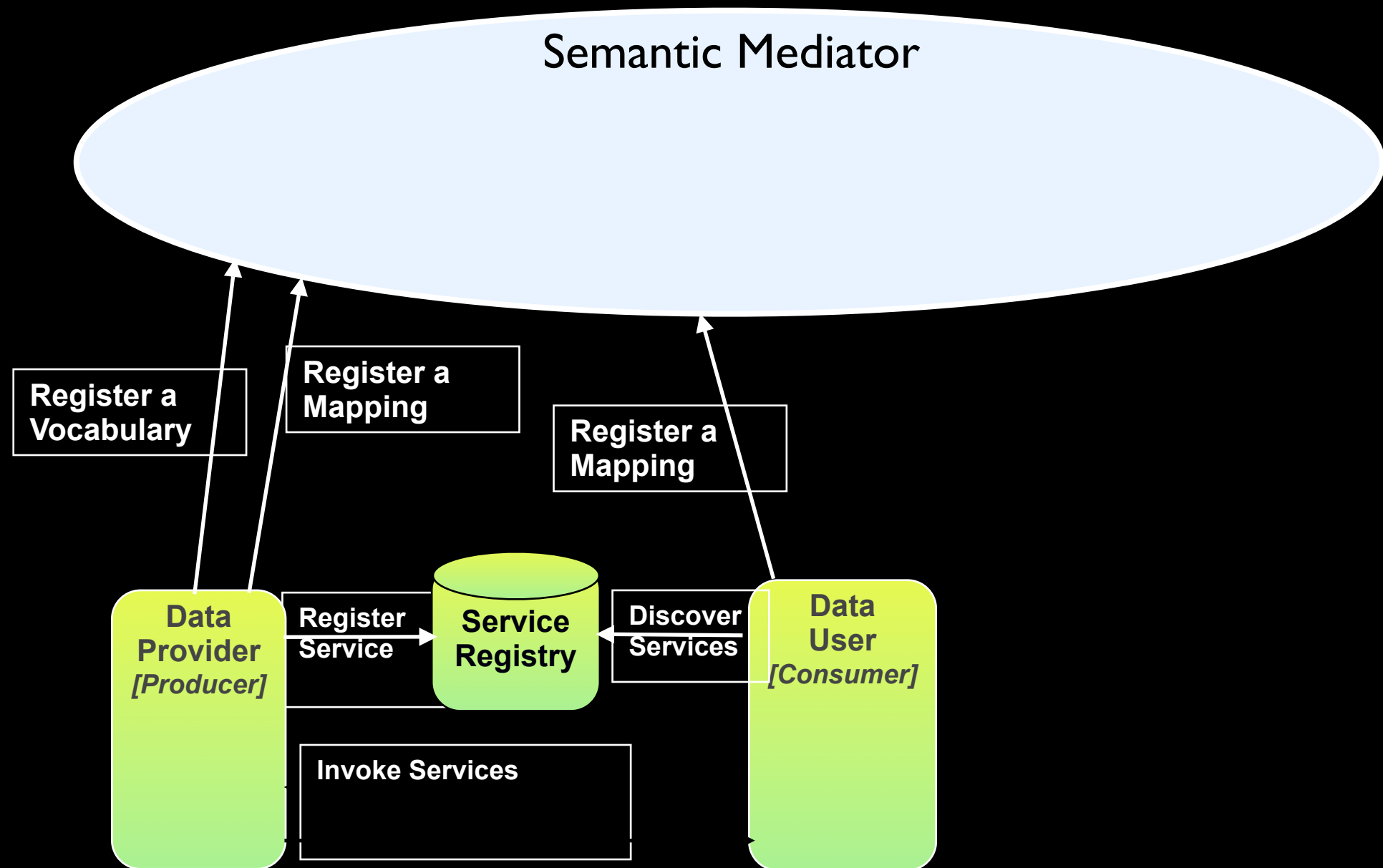
Improve registry services by using them more, making your tools more flexible



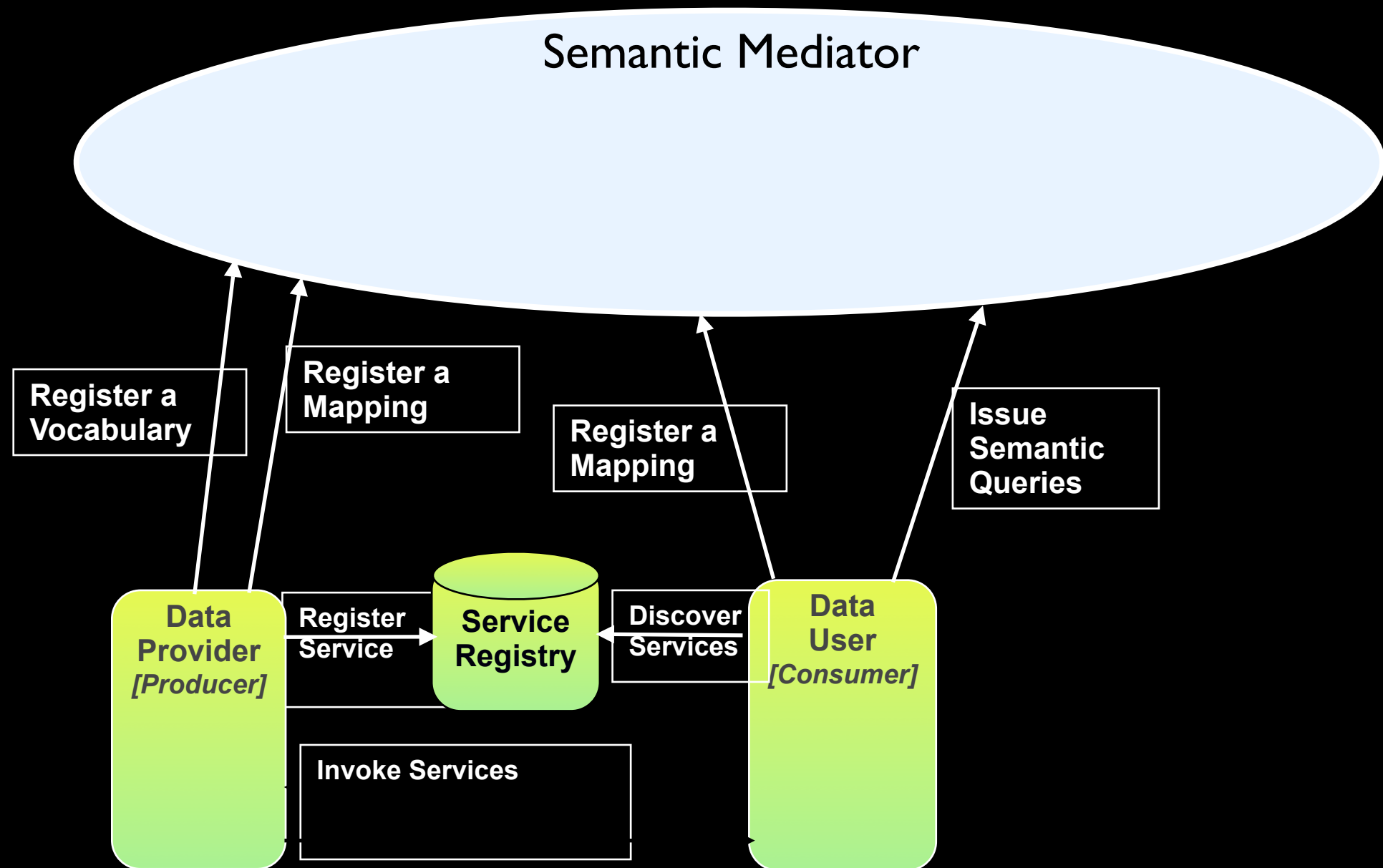
Improve registry services by using them more, making your tools more flexible



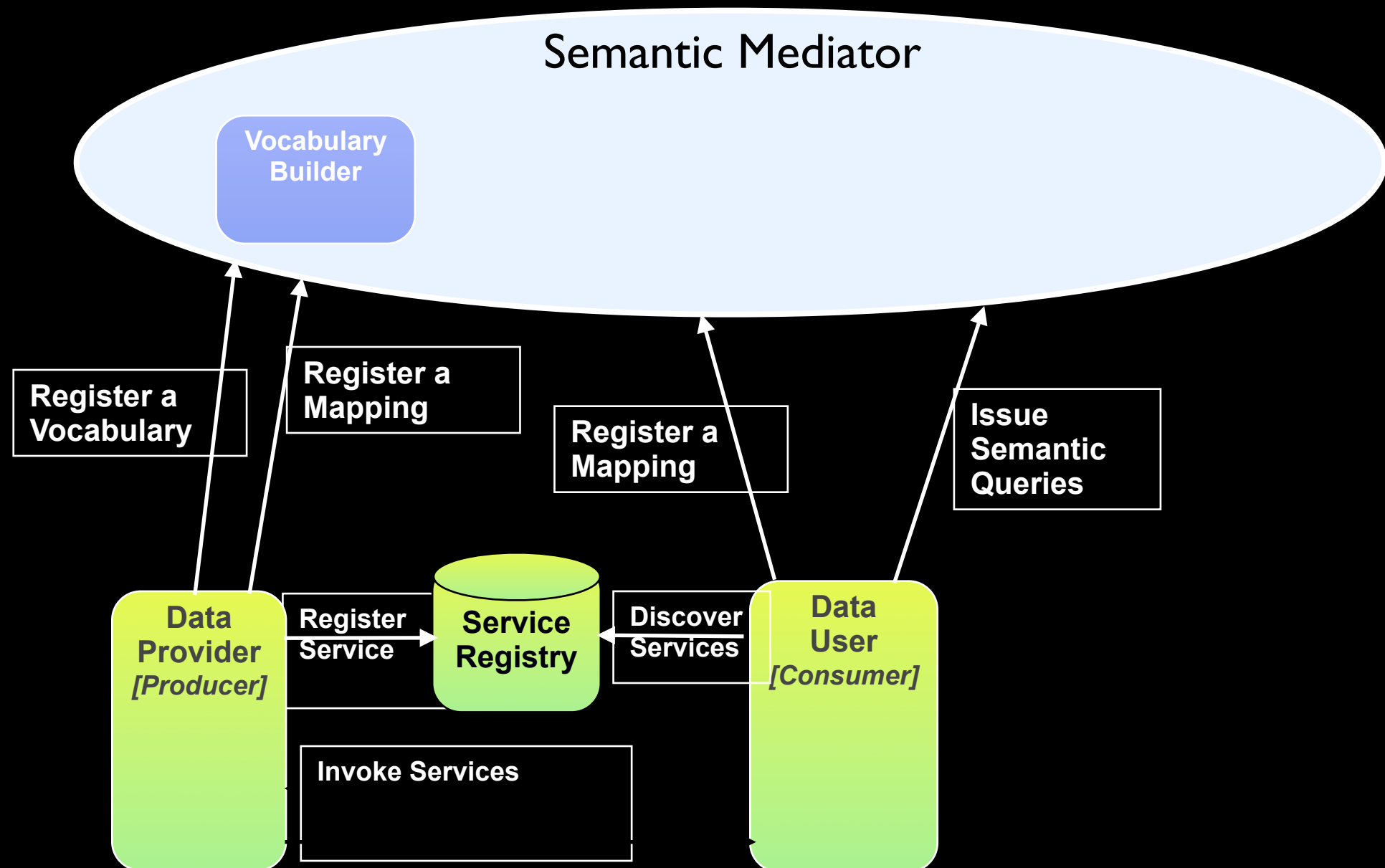
Improve registry services by using them more, making your tools more flexible



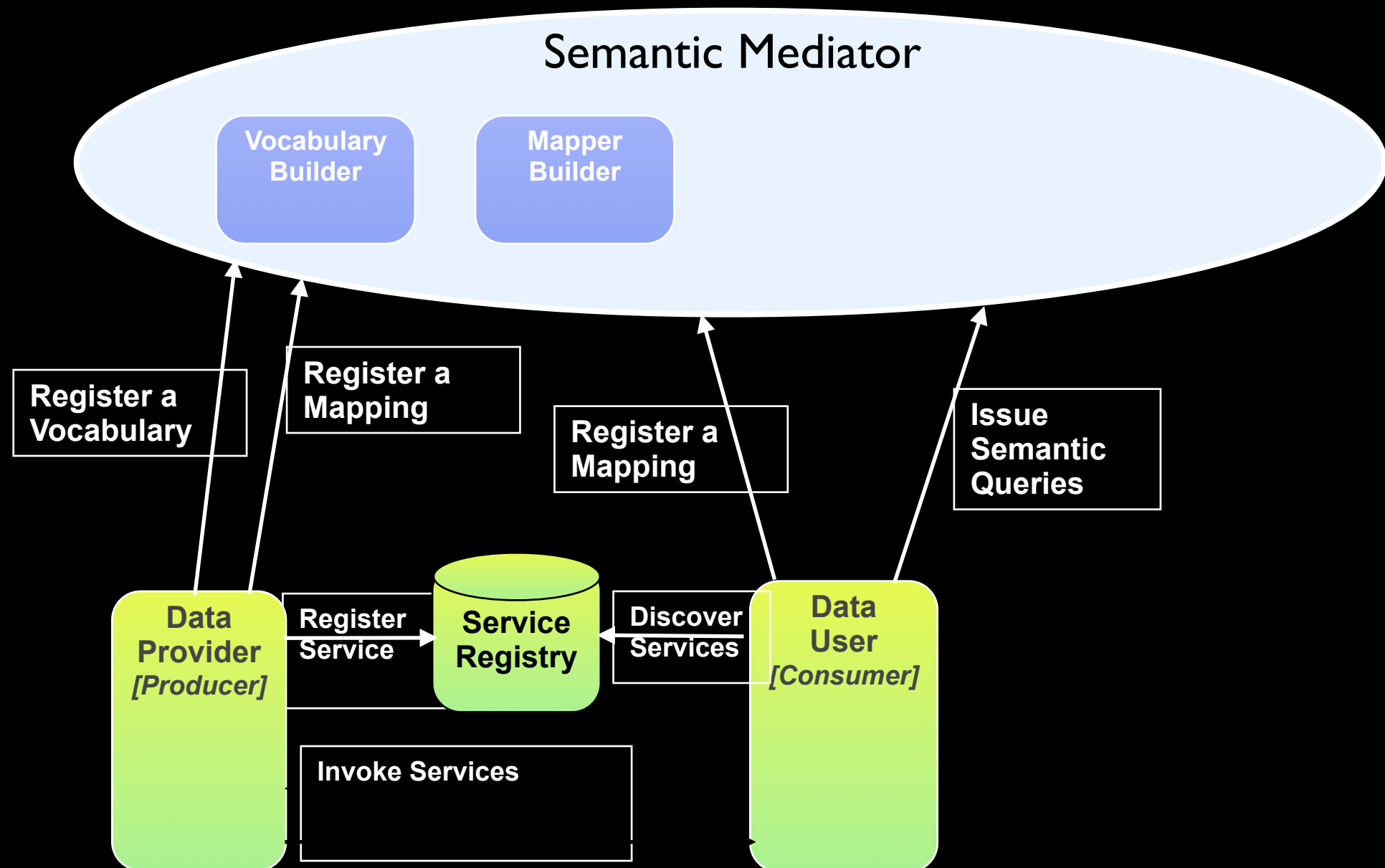
Improve registry services by using them more, making your tools more flexible



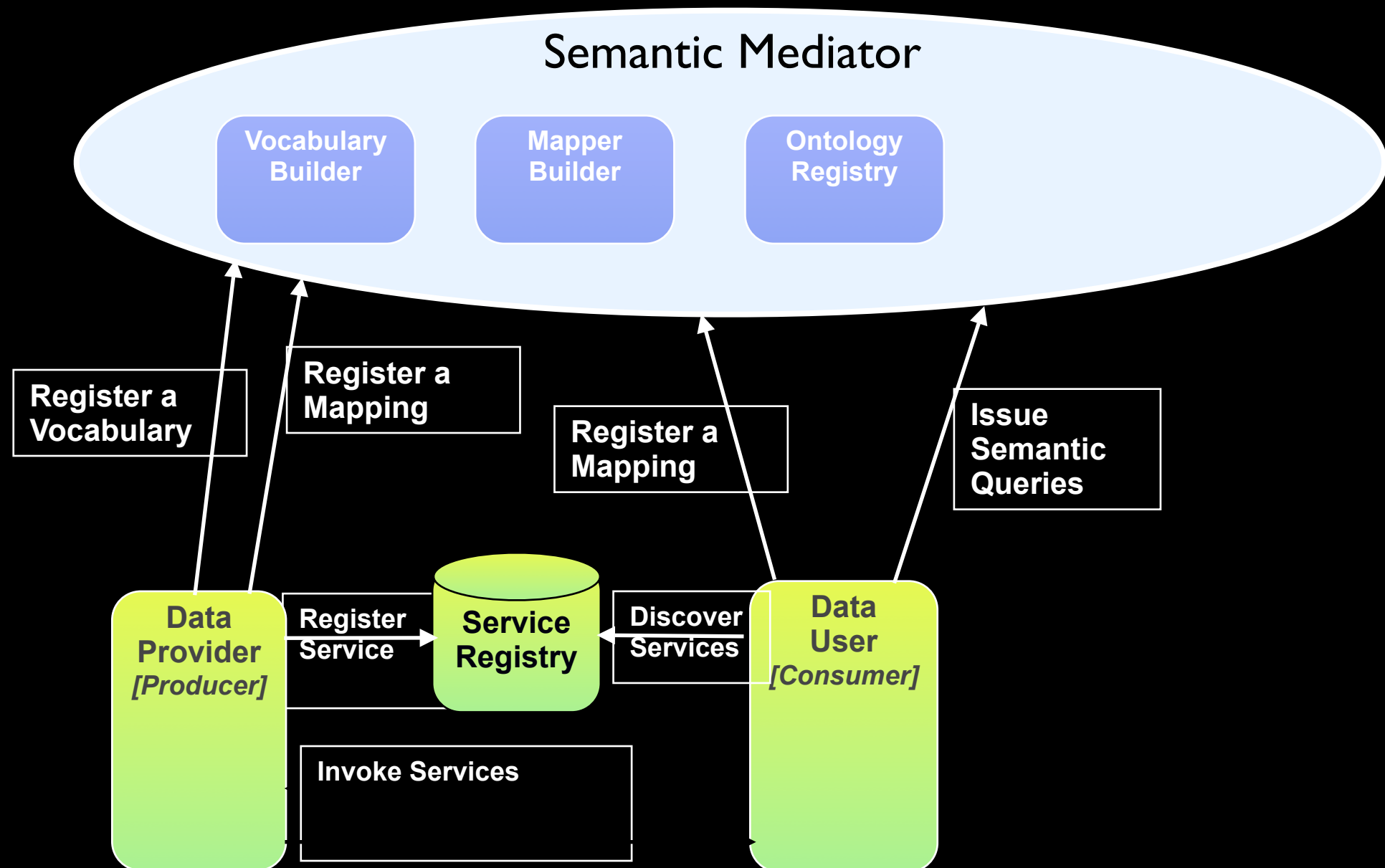
Improve registry services by using them more, making your tools more flexible



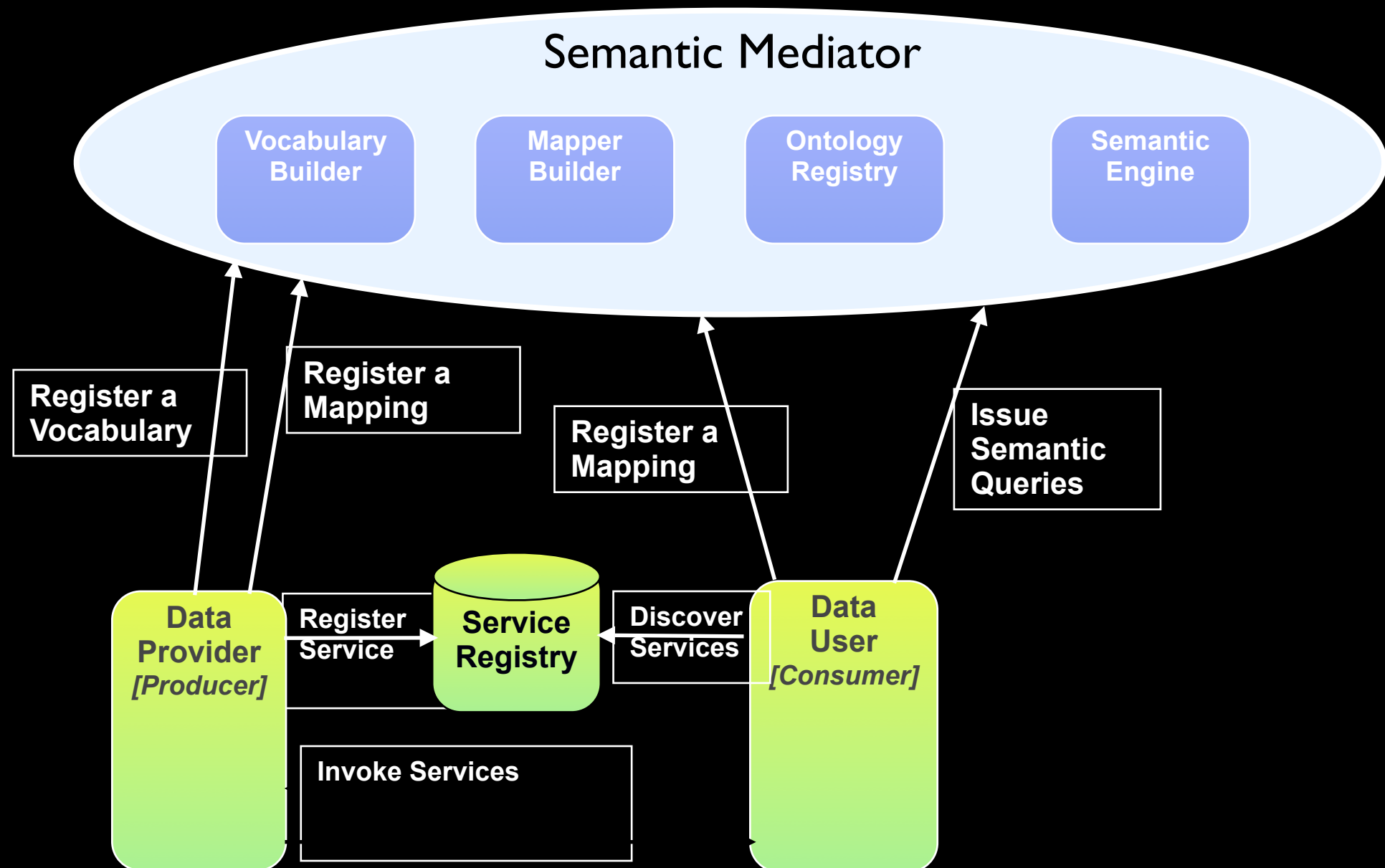
Improve registry services by using them more, making your tools more flexible



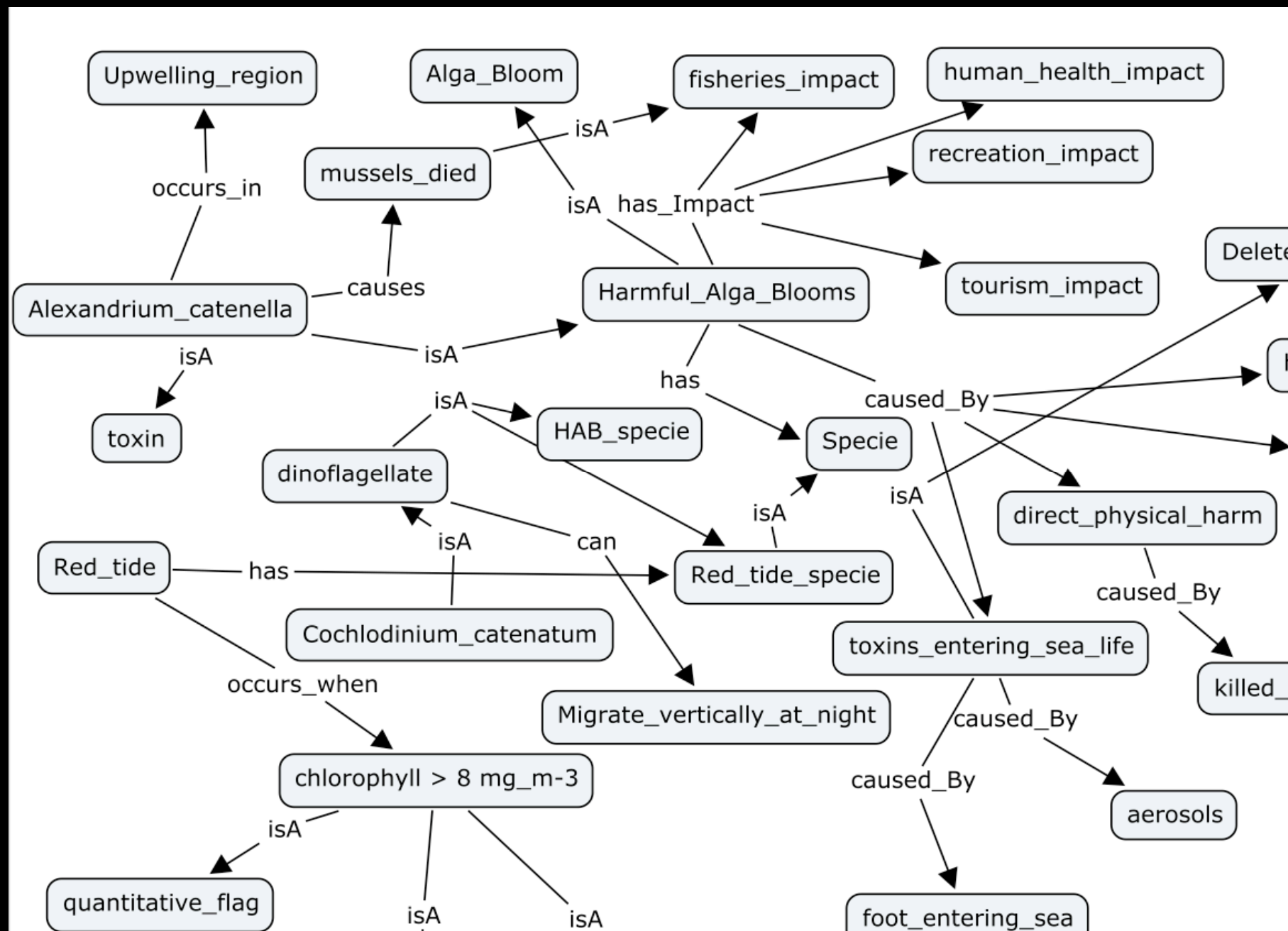
Improve registry services by using them more, making your tools more flexible



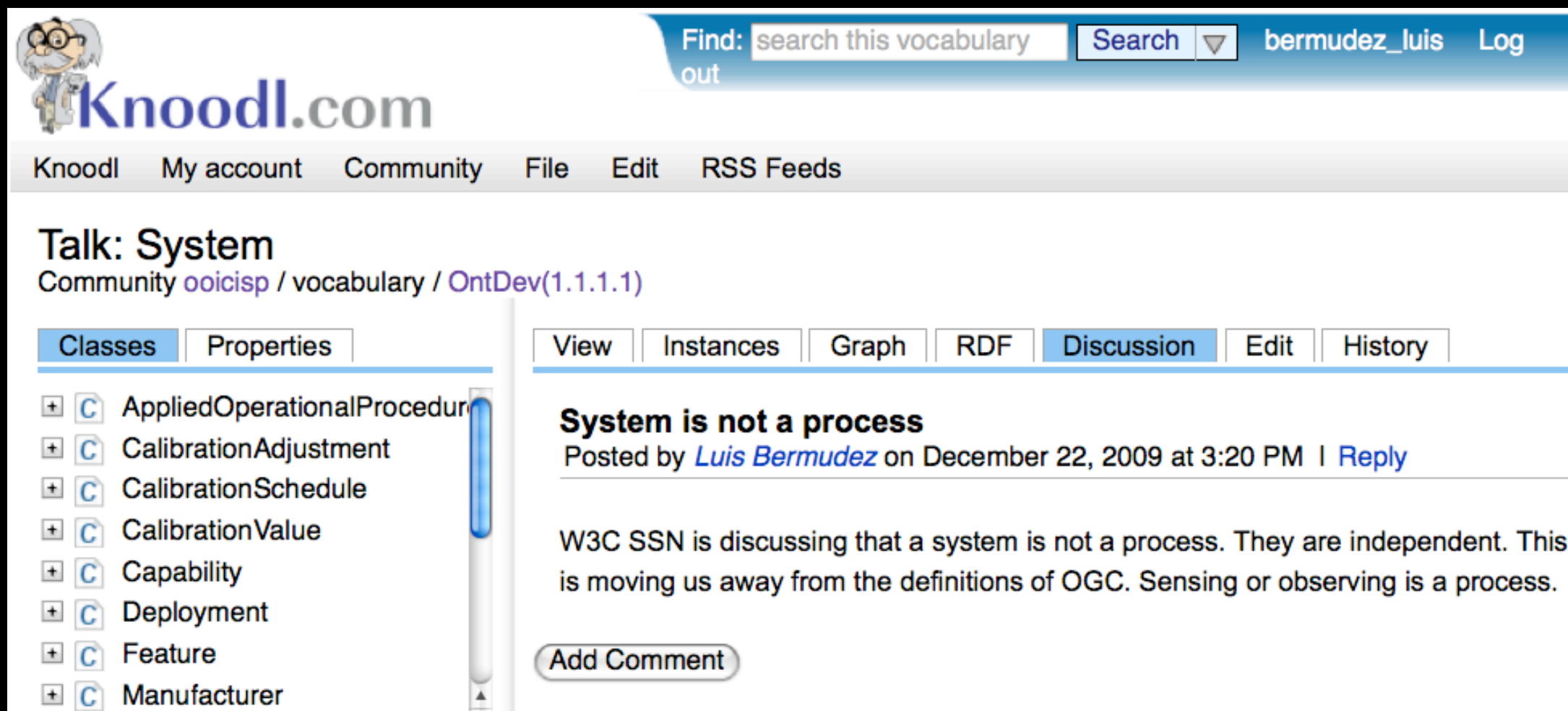
Improve registry services by using them more, making your tools more flexible



Need more ontologies and rules that enable end use of data



Advance tools for better collaboration of ontology development



The screenshot displays the Knoodl.com web application. At the top left is the Knoodl logo, featuring a cartoon character and the text "Knoodl.com". To the right is a search bar with the placeholder text "Find: search this vocabulary", a "Search" button, and a dropdown arrow. Further right are the user name "bermudez_luis" and a "Log out" link. Below the header is a navigation bar with links: "Knoodl", "My account", "Community", "File", "Edit", and "RSS Feeds". The main content area is titled "Talk: System" and includes a breadcrumb trail: "Community oocisp / vocabulary / OntDev(1.1.1.1)". On the left side, there is a sidebar with a "Classes" tab selected, showing a list of ontology classes: "AppliedOperationalProcedur", "CalibrationAdjustment", "CalibrationSchedule", "CalibrationValue", "Capability", "Deployment", "Feature", and "Manufacturer". Each class is preceded by a small icon. On the right side, there is a "Discussion" tab selected, showing a post titled "System is not a process" by "Luis Bermudez" on December 22, 2009 at 3:20 PM. The post text reads: "W3C SSN is discussing that a system is not a process. They are independent. This is moving us away from the definitions of OGC. Sensing or observing is a process." Below the post is an "Add Comment" button. Other tabs visible include "View", "Instances", "Graph", "RDF", "Edit", and "History".

Knoodl.com

Find: search this vocabulary Search bermudez_luis Log out

Knoodl My account Community File Edit RSS Feeds

Talk: System
Community oocisp / vocabulary / OntDev(1.1.1.1)

Classes Properties

- AppliedOperationalProcedur
- CalibrationAdjustment
- CalibrationSchedule
- CalibrationValue
- Capability
- Deployment
- Feature
- Manufacturer

View Instances Graph RDF Discussion Edit History

System is not a process
Posted by [Luis Bermudez](#) on December 22, 2009 at 3:20 PM | [Reply](#)

W3C SSN is discussing that a system is not a process. They are independent. This is moving us away from the definitions of OGC. Sensing or observing is a process.

Add Comment

Governance



Thank you

Luis Bermudez
bermudez@sura.org